

Stat270: Applied Statistics

Unit Outline First Semester 2010

Unit Convenor: Ken Beath

Read this document carefully! Refer to it when you have questions about the unit, before contacting your lecturer. Also refer to the Stat270 web page on Blackboard, which contains up to date information and

ABOUT THIS UNIT

Stat270, Applied Statistics, is a 3 credit point unit run by the Department of Statistics in the Faculty of Science.

This unit aims to extend and broaden the statistical experience you have gained in your first 100 level statistics unit. Topics covered will include statistical inference, data handling, one way and two way analysis of variance and simple and multiple regression.

Stat270 is a core unit in the Statistics program. Together with Stat273, Introduction to Probability, this unit leads on to 300 level units such as Stat375, Linear Models; Stat328, Market Research and Forecasting; Stat373, Design of Surveys and Experiments; and Stat395, Biostatistics and Epidemiology.

Prerequisites: The prerequisites for this unit are STAT170 (P) or STAT171(P); STAT175(P) or GPA > 1.5. Students are expected to be familiar with the material covered in these prerequisites.

TEACHING STAFF

Convenor: Dr Ken Beath, E4A507, phone 9850 8516 email: <u>kbeath@efs.mq.edu.au</u>

Lecturer: Brad Lance E4A551, phone 9850 8559 email: <u>blance@efs.mq.edu.au</u>

Please note that any communication with staff via email will only be conducted using your university student email address or the mail utility under Blackboard. The details of other teaching staff and times for consultation hours will be finalised at the end of Week 1. These will be posted on the web site.

If your question relates to the unit materials (i.e. not a personal administrative one) you are encouraged to use the Stat270 Discussion forum under Blackboard.

CLASSES

Times and locations for all classes can be found on the University web site at: <u>www.timetables.mq.edu.au</u>

Lectures: You are required to attend 3 x 1 hour lectures each week, beginning in Week 1.

Tutorials: You are required to attend 1 x 1 hour tutorial each week, beginning in Week 2.

You will have been assigned to a tutorial at enrolment. To ensure that students numbers are equivalent in each of the tutorial groups, you may only attend the tutorial to which you have been assigned. Lists of tutorial allocations will be placed on the Stat270 Blackboard site at the end of week one. You may only change tutorials by using e-student (navigate from the Macquarie home page, or the student portal <u>https://my.mq.edu.au</u>). A useful link for information about changing your program is

http://www.reg.mq.edu.au/Undergrad/current/currentstudents/cue.htm.

The Ho Kam-chiu Statistics Prize for overall proficiency in 200 level statistics

The prize is open to all students taking at least 9 credit points in 200-level Statistics units in the previous two academic years, but who has not yet qualified for a their degree. The prize of \$500 will be awarded to the most proficient student in this category. Full details of this and other prizes in the department can be found from the Statistics Department web site: <u>http://www.stat.mg.edu.au/</u>.

UNIT WEB PAGE/S

Navigate from http://www.stat.mq.edu.au/ug/units/stat_units200/stat270 and http://learn.mq.edu.au/

This unit will have a Discussions forum, iLectures and other material available online through the University's Online Teaching Facility, Blackboard. A link will be available through the Stat270 web page, as well as from learn.mq.edu.au. Use your student ID number and your myMQ Student Portal Password to access the site. Consult the web page and Discussions forum frequently (at least once a week). Useful guides on using the Online Teaching Facility are also available at this site.

REQUIRED AND RECOMMENDED TEXTS

RECOMMENDED TEXTBOOK: Moore, D.S. and McCabe, G. P.(2006) **Introduction to the Practice of Statistics**, Sixth Edition (W.H. Freeman) is the set text for this unit. This book is available in the Coop Bookshop. The publishers of this text also maintain a web site, on which you will find many useful extra features, such as copies of the tables, quizzes, etc. <u>http://bcs.whfreeman.com/ips6e/</u>

ADDITIONAL REFERENCES: These are available in Reserve.

De Veaux, R.D., Velleman, P.F. and Bock, D.E. (2004) **Stats Data and Models** (Pearson) *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) Ramsay, F.L. and Schafer, D.W. (2002) **The Statistical Sleuth** (Wadsworth) 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)

CALCULATORS An electronic calculator is essential and will be required for the final examination. Only non text returnable calculators are permitted in tests and examinations.

COMPUTING You will be expected to use ACCESS for data handling and 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: <u>http://www.minitab.com</u>. This includes a link to e-academy, for short term rental of the software.

LEARNING OUTCOMES

By the end of Stat270, students should

- be able to produce and interpret appropriate visual displays and numerical summaries to explore data
- understand the importance of data organisation
- be able to decide on the appropriate statistical model for a research question and data set
- be able to decide on the appropriate statistical analysis to be used in given situations
- be able to apply and interpret the statistical methods covered in Stat270 to explore data and provide answers to research questions
- understand the assumptions underlying the models and methods covered in Stat270

continued over

- be able to judge whether or not it is reasonable to make the assumption/s underlying a statistical analysis
- have improved their problem solving ability
- have improved their report writing skills
- have improved their ability to independently use statistical software, and to integrate this with the use of other software

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
- Critical analysis skills
- Problem-solving skills

TEACHING AND LEARNING STRATEGY

Students in Stat270 will attend 3 x 1 hour lectures and 1x 1 hour tutorial. A week by week list of the topics to be covered in Stat270 is given at the end of this document.

Lectures: Copies of the lecture slides will be available under Blackboard. It is recommended that you review the previous week's lecture material before attending the current week's classes. The summaries given for each module of the lecture material will give you guidance about the learning objectives for that specific module, as well as suggestions for additional exercises which will reinforce the concepts in that module.

Tutorials: The format of tutorials will vary from week to week. While most tutorials will be held in your designated classroom, in some weeks they will be held in the computing labs in E4B. Tutorial material does not have to be prepared in advance, but it is recommended that you review the previous week's work before attending the current week's tutorial.

Independent Work: In Stat270 you are also expected to spend some time each week working on your own. This may include revision of lecture and tutorial material, attempts at extra examples (from lectures, your textbook or other text books) and completion of homework tasks and assignments.

At Macquarie University it is expected that the average student would spend approximately 3 - 4 hours per week for each credit point in a unit. This means that for Stat270 you should expect to spend approximately 12 hours per week in both formal classes and independent work.

RELATIONSHIP BETWEEN ASSESSMENT AND LEARNING OUTCOMES

This unit will be assessed as follows:

1.	Project	30%
2.	Class Test	10%
3.	Final Examination	60%

Project An important component of your learning in this unit will involve carrying out a project to investigate a question that you find interesting using the statistical techniques that you are

studying. You will work on the project as part of a group of two or three students, and you are free to arrange your own group (who need not all be members of the same tutorial group). You are also free to choose the topic of your project (in consultation with your group, of course). It may be connected with studies that you are carrying out in another unit, it may be concerned with something that you are doing at work (if you have a job), it may be something of use to a community group that you are involved with, or it may just be a topic that you find interesting. Further details of the project will be available in the first week of semester.

Class Test There will be one class test held during lecture time in the week specified in the unit timetable. The exact lecture time at which it will be held will be specified in lectures two weeks prior to the test. Students may bring into the test **one** A4 sheet, which may have material *handwritten* on both sides. Information about the content and layout of the test will be given in lectures.

The class test should encourage you to consolidate your understanding of the unit material, before moving on to the later modules. It should also give you experience in demonstrating your knowledge, in preparation for the final examination. They will be returned in tutorials the week after you have completed them, and solutions will be available on the web after that.

In cases where a test is missed due to illness or misadventure, no make up test will be given. Your overall assessment mark will be adjusted at the end of the unit.

Illness or Misadventure during semester If illness or misadventure prevents you from completing an assessment task *during semester* you should contact Sue Crowe 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.mg.edu.au/Forms/USSAbsence.pdf

Final Examination This will examine any material covered throughout the unit. Students may bring into the examination **two** A4 sheets, which may have material *handwritten* on both sides.

It is a requirement that students must perform satisfactorily in both the final examination and the other assessment tasks in order to pass the unit.

The University Examination period for First Half Year 2010 is from 7 to 25 June.

You are expected to present yourself for examination at the time and place designated in the University Examination Timetable. The timetable will be available in Draft form approximately eight weeks before the commencement of the examinations and in Final form approximately four weeks before the commencement of the examinations - refer to http://www.timetables.mg.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. The University's procedure for applying for special consideration can be found at http://www.mq.edu.au/policy/docs/special_consideration/procedure.html. Information about unavoidable disruption and the special consideration process is available at . Please note that the appropriate documentation (http://www.reg.mq.edu.au/Forms/APSCons.pdf) must be submitted *before the end* of the examination period.

If a Supplementary Examination is granted as a result of the Special Consideration process the examination will be scheduled after the conclusion of the official examination period.

You are advised that it is Macquarie University policy not to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of

the teaching semester, that is the final day of the official examination period.

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.mg.edu.au/plagiarism/

The policies and procedures explain what plagiarism is, how to avoid it, the procedures that will be taken in cases of suspected plagiarism, and the penalties if you are found guilty. Penalties may include a deduction of marks, failure in the unit, and/or referral to the University Discipline Committee.

Grading in Stat270

Your final grade in Stat270 will be based on your work during semester and in the final examination, as specified in the Assessment section above. The grades allocated are as set out in the Bachelor Degree Rules 10 (2), as follows:

HD	High Distinction	denotes performance which meets all unit objectives in such
		an exceptional way and with such marked excellence that it
		deserves the highest level of recognition
D	Distinction	denotes performance which clearly deserves a very high level
		of recognition as an excellent achievement in the unit
CR	Credit	denotes performance which is substantially better than would
		normally be expected of competent students in the unit
Ρ	Pass	denotes performance which satisfies unit objectives
РС	Conceded Pass	denotes performance which meets unit objectives only
		marginally
F	Fail	denotes performance which does not meet unit objectives

Once your grade has been decided, you are given a *Standardised Numerical Grade*, SNG. SNGs are not marks but are a ranking of students based on marks obtained from all facets of the unit assessment.

The SNGs awarded in a particular unit are designed to indicate that the students in each performance band, from HD to PC, have satisfied the criteria for inclusion in that band and ranks them by their performance within that band. Since the ranges of SNGs differ from band to band the relationship between raw marks and SNGs may differ from band to band even within the same unit. The relationship between raw marks and SNGs would almost always differ between units.

STUDENT SUPPORT SERVICES

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

Other information for Macquarie students is available from the Student Portal <u>https://my.mq.edu.au</u>. This includes access to your official university email.

IT help is available from the IT help desk in the library, and from http://www.lib.mq.edu.au/help/

Help with Stat270: During lectures in Week 1 we will discuss some 'helpful hints' for Stat270 - consult the copy of this document on the web page. It is recommended that you check the Stat270 web page regularly, as this contains the most up to date information about the unit. Of course it is also recommended that you attend lectures and tutorials, as these will also give you up to date information! Many of the assessment tasks will have solutions available from the web site.

We recommend that you seek help with the Stat270 material sooner rather than later by seeing a staff member in consultation hours. For administrative queries, please contact Sue Crowe. For assistance with the material in Stat270, we recommend that you use the Discussions Forum, and consult the lecturer and tutors during their consultation hours ('Office Hours'), or at other times by appointment. A list of the contact details and consultation times for Stat270 will be available from the Stat270 web page.

The Numeracy Centre (C5A 225) may also be able to offer assistance.

STAT270 First Semester, 2010 UNIT Timetable

Note: this is intended as an *approximate* guide to the timing of the topics in this unit. This timing may vary - check the administrative notes on the web page regularly for updated information. Information about due dates, times, etc. will be listed on the handout for the relevant task.

Week (Begins)	Lecture	Tute	Work due
1 (22 Feb)	Introduction and statistical assumptions		
2 (1 March)	Power and sample size	Class- room	
3 (8 March)	One-way ANOVA	Lab	
4 (15 March)	Simple linear regression	С	
5 (22 March)	Multiple linear regression	L	
6 (29 March)	Multiple linear regression continued	С	Test and Project Sign- off
	**** Midsemester Break - two weeks *	* * *	
7 (19 April)	Two-way ANOVA	С	
8 (26 April)	Data Management	L	
9 (3 May)	Reports and Graphical Presentation	С	
10 (10 May)	Contrasts and multiple comparisons for one-way ANOVA	L	First draft of project for comment
11 (17 May)	Contrasts and multiple comparisons for two-way ANOVA	С	
12 (24 May)	ANOVA and regression	С	Project due
13 (31 May)	Revision	С	