



Division of Economic and Financial Studies

STAT375 – Linear Models

Semester 1, 2008

Unit Outline

Unit Convener: A/Prof Gillian Heller

Students in this unit should read this unit outline carefully at the beginning of semester. It contains important information about the unit. If anything in it is unclear, please consult one of the teaching staff in the unit.

About this unit

Stat375 is a three credit point unit offered by the Statistics department in the Division of Economic and Financial Studies. It is offered in first semester, in the day and evening in alternate years. In 2008 it is an evening offering. The prerequisite for this unit is either STAT270, STAT271, BIOL235 or PSY222.

The unit discusses statistical modelling in general and in particular demonstrates the wide applicability of linear models. The emphasis is on practical issues in data analysis using multiple regression models, demonstrated by the use of statistical packages for estimation and diagnostic testing. The unity of regression and analysis of variance models is demonstrated. The unit starts with the classical normal linear model, extending later to the generalized linear model, which includes Poisson and logistic regression.

Teaching Staff

A/Prof Gillian Heller Office: E4A 533 email: gheller@efs.mq.edu.au
A/Prof Peter Petocz Office: E4A 529 email: ppetocz@efs.mq.edu.au

Classes

Students should attend the following classes each week:

- ❖ 2 hour lecture beginning in Week 1: Tuesday 6-8 pm, C4A 312
- ❖ 2 hour tutorial beginning in Week 1: Wednesday 6-8 pm, E4B 111

The timetable for classes can be found on the University web site at:

<http://www.timetables.mq.edu.au>

Text book

Students will need to purchase, from the Co-op Bookshop, a copy of:

Chatterjee S, Hadi AS (2006). Regression Analysis By Example, 4th Edition, Wiley Interscience

The cost is \$157.95, or \$142.15 for Co-Op members.

A calculator with statistical mode will be needed in the final examination.

Software

The statistical software SPSS version 16 will be used. In addition, we will be demonstrating applications using other statistical software, such as Minitab and ARC. All of this software is available in the computer labs in E4A.

Students may wish to purchase their own copy of SPSS for home use. The Co-Op Bookshop has in stock SPSS version 16 Grad pack, which is a full version of SPSS with a four-year licence. The cost is \$199, or \$179.10 for Co-Op members.

Blackboard

Blackboard, which is the upgraded version of WebCT, will be used for distribution of course notes, data sets and solutions, as well as announcements and discussions. The URL to access Blackboard is:

<https://learn.mq.edu.au>

Students are encouraged to use the Discussions on Blackboard to communicate with other students and the lecturers.

Staff consultation hours

Members of the Statistics Department have consultation hours each week when they are available to help students. These consultation hours are listed on the doors of the Statistics staff located on the 5th floor of E4A.

Computing Laboratories

SPSS version 16 is installed in the computing labs in E4B, will be used in tutorial sessions and for assignments. Assignments can be completed in these rooms. You will need to bring a memory stick when using these computers.

Opening hours of computing laboratories:

During semester:	8am - 10pm	Mon-Fri
	9am - 5pm	Sat-Sun

For opening hours during semester breaks see notices outside the rooms. Look for additional information on the whiteboards in the labs. Please note that computing labs may be booked for classes. Check the timetable on the door of the lab to make sure that the room is free.

Learning Outcomes

Objectives

After successfully completing this unit students will be able to

- Define relevant terminology and describe the main concepts of linear models and of simple generalized linear models.
- Formulate and solve theoretical problems in linear modelling (using matrix notation when necessary).
- Fit a linear model to obtain estimates together with their standard errors in applied problems.
- Analyse the adequacy of a linear model.
- Formulate and solve applied problems using linear modelling.
- Use standard statistics packages to carry out these analyses.
- Communicate clearly their knowledge of the subject matter of linear models and their solutions to problems involving linear modelling.

Generic Skills

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 for students to develop their skills in the following:

- enhancing their problem solving ability
- improving their written communication skills, particularly report writing skills
- confidence in the use of the Internet for obtaining information and communicating with others in Online Discussions

Teaching Strategy

Lectures

Lectures begin in Week 1. Copies of the lecture notes will be handed out in week 1; for the rest of semester students should print off the course notes from Blackboard, and bring them to lectures.

Tutorials

Tutorials begin in Week 1 and are based on work from the current week's lecture. Tutorials are held in a computing lab and their aim is to practise techniques learnt in lectures. Mainly SPSS will be used, and occasionally other statistical software will be introduced. Worksheets will be completed as part of the learning process.

Assessment

Coursework

Assignment 1	20%
Assignment 2	20%
Tutorial attendance and participation	10%
	50%
Final Examination	50%

Note that a mark of less than 25/50 in the coursework is considered to be unsatisfactory.

If you gain less than 15/50 in the coursework, the highest grade you can be awarded is a P.

If you gain less than 10/50 marks in the coursework, the highest grade you can be awarded is a PC.

Assignments

There are two assignments, worth 20% each. They should be submitted to the lecturer, by the due time and date. They give you an opportunity to reinforce and apply the concepts covered in lectures and the skills learned in tutorial sessions.

Assignments may be submitted either individually or as a group, where a group should consist of *two* students. If students submit as a group, it is important that each member of the group contributes equally to the assignment. In the case of a group submission, marks allocated to that assignment will be awarded to each student in the group. Groups may be different for assignments 1 and 2, and students may submit one assignment individually and one as part of a group. Please see the front cover of the assignment for information on penalties.

Tutorial attendance and participation

A mark of 10% will be given for tutorial attendance and participation. Occasionally worksheets will be handed in for assessment.

Examination

Students will be permitted to take one A4 sheet, handwritten on both sides, into the final examination.

Students **MUST** perform satisfactorily in the final examination in order to pass the unit regardless of their performance throughout the semester. Students should note that, if they fail the final examination, their coursework will not count and the SNG allocated will be their final exam mark.

The University Examination period in First Half Year 2008 is 11 – 27 June. 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.

<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.efs.mq.edu.au/student_support/important_processes/special_consideration

A supplementary examination will only be granted if a student has satisfactory coursework (ie. at least 15 marks out of 30). 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.

Adverse circumstances during semester

If you experience adverse circumstances during semester, which affects your attendance at lectures and tutorials, and timely handing in of assessment, you need to complete the Advice of Absence form, available at:

<http://www.reg.mq.edu.au/Forms/USSAbsence.pdf>

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/>

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.

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).

Your raw mark for a unit (ie. the total of your marks for each assessment item, including the final examination) 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.

It is important that you realise that the policy does not require that a minimum number of students are to be failed in any unit. In fact it does something like the opposite, in requiring examiners to explain their actions if more than 20% of students fail in a unit.

The process of scaling does not change the order of marks among students. A student who receives a higher raw mark than another will also receive a higher final scaled mark.

For an explanation of the policy see:

<http://www.mq.edu.au/senate/rules/Guidelines2003.doc> or

<http://www.mq.edu.au/senate/rules/detailedguidelines.doc>

Your final grade in Stat170 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
P	Pass	denotes performance which satisfies unit objectives
PC	Conceded Pass	denotes performance which meets unit objectives only marginally
F	Fail	denotes performance which does not meet unit objectives

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/>

STAT375 Linear Models

Semester 1, 2008

Unit schedule

Date (Tuesday)	Wk	Topic	Text chapter	Assessment due
26 Feb	1	Introduction to simple linear regression	1,2	
4 Mar	2	Simple linear regression models, tests	2	
11 Mar	3	Introduction to multiple linear regression	1,3	
18 Mar	4	Multiple linear regression models, tests	3	
25 Mar	5	Diagnostics	4	
1 April	6	Regression graphics & quality of fit		
8 April	7	Qualitative variables, ANOVA	5	Asst 1 due Mon 7 April 4pm
15 April		Mid-semester break		
22 April		Mid-semester break		
29 April	8	Transformations	6	
6 May	9	Variable selection, model building	11	
13 May	10	Introduction to generalized linear models	13	
20 May	11	Logistic regression	12	Asst 2 due Mon 19 May 4pm
27 May	12	Poisson regression	13	
3 June	13	Revision		