



## **STAT811/411 Generalized Linear Models**

### **Unit Information: Semester 2, 2008**

#### **Lecturer**

Associate Professor Gillian Heller

Room : E4A 533

E-mail : [gheller@efs.mq.edu.au](mailto:gheller@efs.mq.edu.au)

Phone: +61 2 9850 8541      Fax: +61 2 9850 7669

#### **Recommended reading**

There is no prescribed text for this unit. The following are useful references:

- McCullagh, P. and Nelder, J.A. **Generalized Linear Models**, 2nd edition, Chapman & Hall.
- Dobson, A. J. (1990). **An Introduction to Generalized Linear Models**, 2nd edition, Chapman & Hall.
- Lindsey, J.K. (1997). **Applying Generalized Linear Models**, Springer.
- De Jong, P. and Heller, G.Z. (2008). **Generalized Linear Models for Insurance Data**, Cambridge University Press.
- Online SAS manual, also available in the SAS software:  
<http://support.sas.com/onlinedoc/913/docMainpage.jsp>

*The first four texts are on 3-day loan.*

Some references to texts on Generalized Linear Models using SAS are given on

<http://www.statsci.org/glm/books.html>

#### **Distance mode**

Distance students will be receiving printed course notes via mail. You will be alerted by email when material has been mailed out, so if you do not receive these within a few days then please contact Lesley Mooney, the Postgraduate Administrator in the Department of Statistics (phone: (02) 9850 8550 e-mail [lmooney@efs.mq.edu.au](mailto:lmooney@efs.mq.edu.au)).

Completed assignments may be mailed to the lecturer at

Department of Statistics, Macquarie University, NSW 2109, Australia  
or e-mailed or faxed.

### **On-campus mode**

Lectures will be held on Monday evenings. From 6pm to approximately 7.30pm the lecture will be in E5A 131. After that there is a computing session, held in E4B 306, till 9pm.

### **Software**

We will be using the software SAS version 9. Should you need your own version of SAS, you can obtain a fully working version (with one year's licence). Please see separate handout concerning this.

### **Blackboard**

We will be using Blackboard for posting of course notes, assignments, solutions and data sets, and online discussions. You are encouraged to use the bulletin board for discussions on the course material. Remember that if you are confused about something, the chances are that other students are also confused. Everybody benefits from the discussions, and you should not be embarrassed to admit that you do not understand a concept.

### **iLecture: digital (audio) recordings of lectures**

Audio recordings of the lectures will be available on the Blackboard site, the day after the lecture is delivered.

### **Web sites**

The public web site for the course is at <http://www.stat.mq.edu.au/units/stat811/> . A very helpful web site is <http://www.statsci.org/glm/> .

### **Timetable**

Week	Lecture	Assessment
1	4 August	
2	11 August	Assignment 1 handed out
3	18 August	
4	25 August	Assignment 1 handed in
5	1 September	
6	8 September	Assignment 2 handed out
7	15 September	
Mid-semester break		
8	6 October	NO CLASS (public holiday)
9	13 October	Assignment 2 handed in
10	20 October	Assignment 3 handed out
11	27 October	
12	3 November	Assignment 3 handed in
13	10 November	

## Unit contents

Week	Contents
1	The classical normal linear model
2	Introduction to GLMs The framework of generalized linear models is introduced, and the theory behind maximum likelihood estimation of the parameters started.
3	Maximum likelihood estimation of the parameters; Poisson regression for count data
4	Inference; comparison of models The deviance as a measure of fit; hypothesis testing
5	Model checking Definition of residuals in glms; checking for violation of model assumptions
6	Model selection; overdispersion Selection of models via AIC; the phenomenon of overdispersion; compound Poisson models to overcome it; the negative binomial model for counts
7	Overdispersion contd; binary responses Quasi-likelihood as an alternative method to overcome overdispersion; logistic regression for binary responses
8	No lecture (public holiday)
9	Logistic regression contd
10	Ordinal and categorical responses Models in which the response is ordinal (e.g. none/mild/moderate/severe) or categorical (e.g. walk/bus/train/car)
11	Correlated data Models for longitudinal data, and other data structures in which there is clustering or correlation between observations
12	Correlated data contd
13	Generalized additive models; more correlated data Models in which no parametric form of the systematic part of the model is specified; more on correlated data

## **Examination**

There will be a two-hour sit-down examination, and a take-home examination which you have four days to complete. You will be permitted to bring an A4 sheet of notes, handwritten or typed, on both sides, into the sit-down examination.

Please note that students who have not performed satisfactorily in the assignments, will not be permitted to write either the sit-down or the take-home examination. Any student who is to be excluded from the examinations, will be notified in writing of this after the due date of the last assignment.

**Assessment** will be as follows :

Three assignments	45%
Examination:	
Sit-down component	25%
Take-home component (4 days)	30%

*In order to pass the unit, students need to perform satisfactorily on all components of assessment (assignments and examinations).*

## **Plagiarism**

Please read the University's plagiarism policy carefully at <http://www.student.mq.edu.au/plagiarism/> .