



Division of Economic and Financial studies

## **STAT 818: Epidemiological Methods**

Second Semester 2006

Unit Outline

Unit Convenor: Kehui Luo

Students in this unit should read this unit outline carefully at the start 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

An introduction to the commonly used study designs – randomised clinical trials, case-control studies, cohort studies and cross sectional surveys – with applications to epidemiological problems. Statistical methods for analysing data from such studies, with particular emphasis on categorical data analysis, including logistic regression and the Poisson regression, and models for censored survival data. **SAS** (version 8.00 or newer) and **EcStat**, an add-in program in **MS Excel**, are used throughout this course.

## TEACHING STAFF

Convenor: Dr Kehui Luo  
Room E4A 532, phone: 9850 8563  
E-mail: [kluo@efs.mq.edu.au](mailto:kluo@efs.mq.edu.au)

Other teaching staff: Ms Ruth Penman  
Room E4A 551, phone: 9850 7838  
E-mail: [rpenman@efs.mq.edu.au](mailto:rpenman@efs.mq.edu.au)

Ruth Penman will be teaching Weeks 5 and 7, and Dr Kehui Luo will lecture all other weeks.

**Note:** Only the university official email address may be used to communicate with staff. Staff consultation times for this unit will be advised at the first lecture of the semester.

***If you have any query related to this unit, please contact Dr Kehui Luo.***

## CLASSES

Internal students are required to attend per week, a 3-hour lecture beginning in Week 1. Attendance to tutorial is optional, beginning in Week2. Times and locations are as follows:

	Time	Venue
Lectures	Wednesday 2-5 pm	E6A 133
Tutorials	Wednesdays 9-10 am	E4B 102
	Wednesday 10-11 am	E4B 102

## REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS

### ***Recommended textbook:***

Epidemiological research methods, by D. McNeil, Wiley, 1996.

### Recommended reading:

Epidemiology in Medicine, by H. Hennekens & J. E. Burning, Little Brown, 1987.

Statistics in Epidemiology, by H. Sahai & A. Khurshid, CRC Press, 1996.

Statistical Methods in Medical Research, 3rd Edition, by P. Armitage & G. Berry, Blackwell, 1994.

Epidemiologic Research: Principles and Quantitative Methods, by D. G. Kleinbaum et al, Van Nostrand Reinhold, 1982.

An introduction to categorical data analysis, by A. Agresti, Wiley, 1996.

Logistic regression: a self-learning text, by D. G. Kleinbaum, Springer-Verlag, 1992.

Applied Logistic Regression, D. Hosmer & S. Lemeshow, John Wiley & Sons, 1989.

Survival Analysis: A Self-Learning Text, by D. G. Kleinbaum, Springer, 1996.

Modelling survival data in medical research, by D. Collett, Chapman & Hall, 1994.

Analysis of Survival Data, by D. R. Cox & D. Oakes, Chapman & Hall, 1984.

***For internal students, weekly lecture notes will be handed out at the beginning of the lecture. For external students, course materials including lecture notes will be sent to you by mail or email or made available on the unit web site before or at due course.***

***Software:*** SAS (version 8.00 or newer) and EcStat, an add-in program in MS Excel, are used throughout this course.

***Most important, please find and read the information about obtaining free SAS software and the Student Use Agreement form attached.***

***Calculator:*** An electronic calculator is required throughout this unit. Only non-text returnable calculators are permitted to be used in the final examination.

## UNIT WEB PAGE

The unit web page is at <http://www.stat.mq.edu.au/units/stat818/>, having links to unit outline, course materials on WebCT and some useful web sites.

### ***Course Materials and Online Discussion:***

All course materials including lecture notes, assignments and their solutions, and data files can be downloaded from STAT818 Epidemiological Methods web page on WebCT at <http://online.mq.edu.au/webct/homearea/homearea?>.

To login into WebCT, you will be asked for the user name and password. You should read the information about user name and password above the login box if you use it for first time. After you are in WebCT, click [STAT818 Epidemiological Methods](#). There are a number of things on this page. You may click the Discussions (ie, Bulletin Board) button on the web page for online discussion with other students enrolled STAT395/818 and lecturers. Note that you should visit this web site regularly for updated course materials, and also possible announcements or updates placed on the Discussion board from the Lecturers.

### ***For distance students only, questions relating to course administration should be directed to the Distance MAppStats Co-ordinator:***

Ms Lesley Mooney

Room E4A 518, phone: +61 2 9850 8550, fax: +61 2 9850 7669

Email: [lmooney@efs.mq.edu.au](mailto:lmooney@efs.mq.edu.au)

## LEARNING OUTCOMES

By completion of STAT818, students should

- understand the four commonly used Epidemiological designs: Case-control study, cohort study, cross-sectional study and clinical trials;
- understand and be able to calculate odds ratios and relative risks;
- be able to undertake stratified analysis;
- understand logistic and Poisson regression methods;
- understand basic methods of survival analysis including the Kaplan-Meier method and the Cox proportional hazards regression model;
- understand sample size calculation;
- be able to apply appropriate statistical method(s) acquired in this unit for the analysis of data;
- be able to analyse data using SAS and EcStat;
- be able to interpret results from analysis;
- have the skills necessary to critically appraise a piece of epidemiological or related literature, or research literature in general;

- have generally improved their problem solving ability;
- have improved their skills in the results interpretation;
- have improved their ability to use computing software (SAS and EcStat) in solving practical problems.

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 areas:

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

## TEACHING AND LEARNING STRATEGY

**Lectures:** Lectures begin in Week 1. Students are required to attend a 3-hour lecture each week. Topic(s) for each week are set in the Unit Schedule below. Students are encouraged to read the relevant chapter(s) in the recommended text and readings before coming to lecture. Notes containing lecture slides will be handed out to students at the beginning of each lecture. A set of homework (tutorial) exercises will be given out at the end of each lecture.

### *Unit Schedule*

Week 1:	Introduction to epidemiological research methods (Chapter 1 in McNeil's book); Introduction to EcStat	
Week 2:	Review of basic statistical methods; Introduction to SAS	(Chapter 3)
Week 3:	Simple methods for binary outcomes and determinants; Matching in case-control studies	(Chapters 2 and 8)
Week 4:	Mantel-Haenszel methods; Meta-analysis.	(Chapter 4)
Week 5:	Logistic regression I	(Chapter 5)
Week 6:	Logistic regression II	(Chapter 6)
Week 7:	Poisson regression	(Chapter 6)
Week 8:	Kaplan-Meier survival curves	(Chapter 7)
Week 9:	The proportional hazards model	(chapter 7)
Week 10:	The proportional hazards model (contd.)	(chapter 7)
Week 11:	Sample size calculations	(Chapter 9)
Week 12:	Critical appraisal	(read relevant handouts)
Week 13:	Revision; Some readings on clinical trials for STAT818 only.	

**Tutorials (optional):** Tutorials start from Week 2. Students may attend a 1-hour tutorial per week, and complete the tutorial exercises for the week before coming to or during their tutorial class according to the instructions on the tutorial.

**Assignments:** There are three assignments set for students to complete independently, as part of unit assessment. To assist with further learning, solutions to assignments will be made available to students later on the unit web site.

## RELATIONSHIP BETWEEN ASSESSMENT AND LEARNING OUTCOMES

Three assignments are set for students to apply the knowledge gained from lecture(s) and from their own reading. Questions and tasks there have been designed to assess a student's level in relation to the unit learning outcomes. Students will be further evaluated in relation to the unit learning outcomes in the final examination.

This unit will be assessed according to the following components:

Assignments	45%
Examination	55%

Note carefully: In order to pass STAT818 students must satisfy each of the following requirements:

- \* Submit all assignments on time.
- \* Perform satisfactorily in the final examination.
- \* Perform satisfactorily (ie, achieve pass standard) in the overall assessment.

**Assignments:** Three assignments will be set and handed out at lectures to internal students and they will also be available on the unit web site for external students as well as internal students to download. On-time submission for each assignment is compulsory. The following are the hand-out and hand-in weeks, and assessment percentage:

Assignment	Hand out	Hand in	% in total assessment
1	Week 4	Week 6	15
2	Week 7	Week 9	15
3	Week 10	Week 12	15

**Note:** Details about due date and submission for each assignment will be included in the assignment.

**Examination:** The final examination will examine any material covered in the unit. You may bring into the examination an A4 size sheet of notes, formulas, etc, written on both sides. Any other materials such as lecture notes and text books are not permitted. Calculators (non text returnable) should be brought into the exam. The right to bring an A4 sheet into the examination may be forfeited in any supplementary examination, on the grounds that extra preparation time will have been available to the candidate.

The University Examination period in Second Half Year 2006 is from 15 November to 1 December.

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. You may check the following web site: <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>. Please note that this form and relevant documentation must be submitted before the end of the examination period.

Note that there is a Division policy on the web site, [http://www.efs.mq.edu.au/student\\_support/important\\_processes/special\\_consideration](http://www.efs.mq.edu.au/student_support/important_processes/special_consideration), regarding requests for special consideration for examinations and the granting of supplementary examinations.

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, which 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.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).

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.

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/MQUonly/Issues/Guidelines2003.doc> or  
<http://www.mq.edu.au/senate/MQUonly/Issues/detailedguidelines.doc>.

**Grading in STAT818:** Your final grade will be based on your performance in various parts specified in the Assessment section. The grades are awarded according to rules set out in the Bachelor Degree Rules 10 (2) as follows:

**HD – High Distinction:** Denotes a performance that 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 that clearly deserves a very high level of recognition as an excellent achievement in the unit.

**C – Credit:** Denotes performance that is substantially better than would normally be expected of competent students in the unit.



**P – Pass:** Denotes performance that satisfies unit objectives.

**PC – Conceded Pass:** Denotes performance that meets unit objectives only marginally.

**F – Fail:** Denotes performance which does not meet unit objectives.

Once your final grade has been decided, on the basis of your performance in the unit, you are given a *standardized numerical grade* (SNG). SNG is not a mark but a ranking of students.

The SNGs awarded in a particular unit are designed to indicate that the students in each performance band, from HD to F, 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 be accessed at <http://www.student.mq.edu.au>. The division of EFS also provides a number of student support services. For details, please visit [http://www.efs.mq.edu.au/student\\_support](http://www.efs.mq.edu.au/student_support).

All course materials including lecture notes, assignments and their solutions, and data files can be downloaded from STAT818 Epidemiological Methods web page on WebCT at <http://online.mq.edu.au/webct/homearea/homearea?>. You should visit this web site regularly for updated course materials, and also possible announcements or updates placed on the Discussion board from the Lecturers.

***Seek help from your lecturers sooner by seeing them in their office hours or make an appointment to see a staff at other times.***