STAT818

Epidemiological Methods

S2 External 2017

Dept of Statistics

Contents

General Information 2

Learning Outcomes 2

General Assessment Information 3

Assessment Tasks 4

Delivery and Resources 5

Unit Schedule 7

Policies and Procedures 8

Graduate Capabilities 9

Changes from Previous Offering 12

Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

General Information

Unit convenor and teaching staff
Unit Convenor/Lecturer
Kehui Luo
kehui.luo@mq.edu.au
Contact via kehui.luo@mq.edu.au
Room 529, 12 Wally's Walk
Mondays 2 - 4 pm

Lecturer/Tutor
Mark Donoghoe
mark.donoghoe@mq.edu.au
Contact via mark.donoghoe@mq.edu.au
Room 528, 12 Wally's Walk
TBD

Credit points
4

Prerequisites

Corequisites
(Admission to MAppStat or GradDipAppStat and STAT680) or (admission to MSc or MActPrac or MDevStudGlobalHlth or MDevStud)

Co-badged status
Co-taught with STAT718 and STAT395

Unit description
This unit provides an introduction to the more commonly used research study designs (randomised prospective trials, case control studies, cohort studies and cross-sectional studies) with applications to epidemiological problems. The unit explores statistical methods for analysing data from such studies, with particular emphasis on categorical data analysis, including logistic and Poisson regression, and models for censored survival data.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

Demonstrate a good understanding of the four commonly used Epidemiological designs, and be able to apply appropriate epidemiological measures in both unstratified and stratified analyses and interpret the results from the analyses.

Have a good understanding of and be able to apply logistic and Poisson regression methods, and commonly used methods of survival analysis including the Kaplan-Meier method and the Cox proportional hazards regression model.

Have a good understanding of sample size issues and be able to perform sample size calculations.

Be able to apply appropriate statistical method(s) acquired in this unit to analyse real world data using SAS, and present the results in written report.

Have the skills necessary to critically appraise a piece of research literature.

General Assessment Information

Students enrolled in this unit are required to complete three assignments, and sit a three-hour written examination.

Assignments:

The three assignments (15% each) are set for students to complete independently, applying the knowledge gained from lectures and their own reading, with and/or without using the statistical software, SAS, and they will be made available on iLearn. Each of the three assignments should be submitted electronically on the unit iLearn by its due date and time specified in the assignment. Students must keep a soft or hard copy of any assignment submitted. In the event of an assignments being misplaced, a replacement of it will be requested.

No extension will be granted and students who have not submitted an assignment prior to the deadline will be awarded a mark of 0 for the assignment, except for cases in which an application for disruption of studies is made and approved.

Examination:

The three-hour written examination will be timetabled in the official University examination timetable, which will be available in draft form approximately eight weeks before the commencement of the the University examinations and in final form approximately four weeks before the commencement of the examinations at http://students.mq.edu.au/student_admin/exams/. The only exception to not sitting an examination at the designated time is because of unavoidable disruption. In this case, you may notify the University of your disruption to studies by providing required documentation through https://ask.mq.edu.au/. Please see Disruption to Studies policy at http://www.mq.edu.au/policy/docs/disruption_studies/policy.html for further information. if you notify the University of your disruption to studies for your examination and are then granted with a supplementary examination, you must make yourself available for the week of December 11-15, 2017. This is the University session 2 supplementary exam period. If you are not available at that time, there is no guarantee an additional examination time will be offered. Specific supplementary examination dates and times will be determined at a later date.

Assessment Tasks

Name	Weighting	Hurdle	Due
Assignment 1	15%	No	Week 6
Assignment 2	15%	No	Week 9
Assignment 3	15%	No	Week 12
Examination	55%	No	University Examination Period

Assignment 1

Due: **Week 6**
Weighting: **15%**

On successful completion you will be able to:

- Demonstrate a good understanding of the four commonly used Epidemiological designs, and be able to apply appropriate epidemiological measures in both unstratified and stratified analyses and interpret the results from the analyses.

Assignment 2

Due: **Week 9**
Weighting: **15%**

On successful completion you will be able to:

- Have a good understanding of and be able to apply logistic and Poisson regression methods, and commonly used methods of survival analysis including the Kaplan-Meier method and the Cox proportional hazards regression model.

Assignment 3

Due: **Week 12**
Weighting: **15%**

On successful completion you will be able to:

- Have a good understanding of sample size issues and be able to perform sample size calculations.
- Be able to apply appropriate statistical method(s) acquired in this unit to analyse real world data using SAS, and present the results in written report.

Examination

Due: **University Examination Period**
Weighting: **55%**

On successful completion you will be able to:

- Demonstrate a good understanding of the four commonly used Epidemiological designs, and be able to apply appropriate epidemiological measures in both unstratified and stratified analyses and interpret the results from the analyses.
- Have a good understanding of and be able to apply logistic and Poisson regression methods, and commonly used methods of survival analysis including the Kaplan-Meier method and the Cox proportional hazards regression model.
- Have a good understanding of sample size issues and be able to perform sample size calculations.
- Have the skills necessary to critically appraise a piece of research literature.

Delivery and Resources

Classes

There is no on-campus session for distance (external) students in this unit.

External students are expected to study the course notes and attempt the weekly tutorial exercises. The course notes for each week will be made available on iLearn prior to the lecture. Solution to each tutorial, if relevant, will be made available after it is discussed in the STAT395 tutorial class.

You are welcome to contact the lecturer with questions related to the unit by email or telephone (61 2 98508563). Only the **Macquarie University student email accounts** may be used to communicate with staff.

For external students only, questions relating to course administration should be directed to the postgraduate administrator:

Ms Lesley Mooney

Phone: 61 2 9850 8550

E-mail: lesley.mooney@mq.edu.au

Note:

Internal students are required to attend a 3-hour lecture per week **beginning in Week 1,** and may also attend (not compulsory) a 1-hour laboratory tutorial class designed for STAT395 students, **beginning in Week 2**.

The timetable for classes can be found on the University web site at: http://www.timetables.mq.edu.au/. In the case of changing classes, time and/or location, you will be informed at the lecture and/or on the unit iLearn (https://ilearn.mq.edu.au/) in advance.

Course materials and recommended reading

Weekly lecture notes will be made available on the unit iLearn at https://iLearn.mq.edu.au/ at least one day before the lecture. Students should print out and bring the relevant lecture notes into the lecture.

There is no compulsory textbook for this unit. Students may find the following book by McNeil (1996) a useful supplement to the lecture notes.Other useful references are also provided below.

Recommended reading:

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

Other useful references:

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, Spring-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.

Technology Used and Required

Software: SAS is used in this unit. SAS 9.4 is available via iLab (https://wiki.mq.edu.au/display/iLab/Applications+on+iLab) in all E4B computing labs on campus and outside the University. Remember that any work or results produced via iLab in those labs must be saved to the iLab desktop and then emailed to yourself. For information about iLab, visit https://wiki.mq.edu.au/display/iLab/About. You may also download SAS University Edition (see details at https://www.sas.com/en_us/software/university-edition/download-software.html) for home use, known as SAS studio. It is free for downloading at http://www.sas.com/en_za/software/university-edition.html where you can also find information about this free software.

Calculator: An electronic calculator is required throughout this unit. Only calculators with no text retrieval capacity are permitted to be used in the examination.

Unit Web Page and iLearn Access: The unit web page is available on iLearn and can be accessed at http://ilearn.mq.edu.au, under 'STAT395 Biostatistics and Epidemiology/ STAT818_STAT718 Epidemiological Methods' link. **Note** that you should visit this web site regularly for course materials including lecture slides, lecture recordings, tutorials and assignments, and also possible announcements placed by the Lecturer.

The **Discussion Forum** on the unit **iLearn** can be used for online discussion with other students enrolled in STAT395 or STAT818_STAT718 on any problems or topics related to the unit. The lecturer will visit the place from time to time.

Learning and Teaching activities

Lectures: Lectures begin in **Week 1**. Internal students are required to attend a 3-hour lecture each week. Topic(s) for each week are set in the Unit Schedule at the end of this unit outline. Students are encouraged to read relevant lecture notes before coming to the lecture.

An iLecture will be recorded for each lecture **when possible** and made available on iLearn (under ECHO^{360}) soon after the lecture is completed.

Tutorial Exercises: Each week a set of tutorial exercises will be made available for students to practice, which is usually presented on the last slide(s) of each lecture. Its solution will be discussed in the STAT395 tutorial class of the following week (starting from Week 2), and also made available on **iLearn** soon after the class.

Assignments: **Three assignments** are set in this unit for students to complete independently. To assist with further learning, solution to each assignment (when possible) will be made available on **iLearn**, soon after the assignment being marked.

Unit Schedule

Week	Topic
1	Introduction to epidemiological research methods and SAS
2	Review of basic statistical methods

3	Simple methods for binary outcomes and determinants; Matching in case-control studies
4	Mantel-Haenszel methods; Meta-analysis.
5	Logistic regression I
6	Logistic regression II
7	Poisson regression
8	Kaplan-Meier survival curves
9	Cox proportional hazards model
10	Cox proportional hazards model (Contd.) and its extension
11	Sample size calculations
12	Critical appraisal
13	Revision; Some readings on clinical trials

Note: *There may be minor deviations from this timetable if insufficient time is available for some topics.*

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy_2016.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy (in effect until Dec 4th, 2017): http://www.mq.edu.au/policy/docs/disruption_studies/policy.html

Special Consideration Policy (in effect from Dec 4th, 2017): https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration

In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and

decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

Learning outcome

- Have the skills necessary to critically appraise a piece of research literature.

Assessment task

- Assignment 3

PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

Learning outcomes

- Demonstrate a good understanding of the four commonly used Epidemiological designs, and be able to apply appropriate epidemiological measures in both unstratified and stratified analyses and interpret the results from the analyses.
- Have a good understanding of and be able to apply logistic and Poisson regression methods, and commonly used methods of survival analysis including the Kaplan-Meier method and the Cox proportional hazards regression model.
- Have a good understanding of sample size issues and be able to perform sample size calculations.
- Be able to apply appropriate statistical method(s) acquired in this unit to analyse real world data using SAS, and present the results in written report.
- Have the skills necessary to critically appraise a piece of research literature.

Assessment tasks

- Assignment 1
- Assignment 2
- Assignment 3
- Examination

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based

critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

- Have a good understanding of and be able to apply logistic and Poisson regression methods, and commonly used methods of survival analysis including the Kaplan-Meier method and the Cox proportional hazards regression model.
- Be able to apply appropriate statistical method(s) acquired in this unit to analyse real world data using SAS, and present the results in written report.
- Have the skills necessary to critically appraise a piece of research literature.

Assessment tasks

- Assignment 2
- Assignment 3

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcome

- Be able to apply appropriate statistical method(s) acquired in this unit to analyse real world data using SAS, and present the results in written report.

Assessment tasks

- Assignment 1
- Assignment 2
- Assignment 3
- Examination

PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

Learning outcome

- Be able to apply appropriate statistical method(s) acquired in this unit to analyse real world data using SAS, and present the results in written report.

Assessment tasks

- Assignment 3
- Examination

Changes from Previous Offering

No major changes from previous offerings.