Description

Biostatistics is fundamental to contemporary biomedical research. For example, biostatistics plays a central role in evaluating treatments for cancer and heart disease, in determining the effectiveness of heart and kidney transplants, in monitoring and predicting the pattern of the HIV/AIDS and swine 'flu pandemics, and much much more. Biostatistics has also emerged in recent years as a key collaborating discipline in bioinformatics. You will learn that expert advice from biostatisticians and epidemiologists is crucial for drug development, health-data collection and analysis, for informing government debate and for developing effective public health policies and strategies.

Aims and objectives

Biostatistics III aims to provide students with fundamental knowledge on: the design and analysis of clinical trials; the design and analysis of epidemiological studies; statistical issues arising in biomedical research; and modern methods for the analysis of biostatistical data.

By the end of this course, students should be able to apply their biostatistical knowledge to real-life problems in medical research; design and analyse clinical trials; design and analyse case-control, cohort and related studies; and develop and carry out appropriate statistical analyses in R.

Lecturer

Professor Patty Solomon Office 739, Level 7 Innova21 Building
Email: patty.solomon@adelaide.edu.au
Homepage: http://www.maths.adelaide.edu.au/patty.solomon

Lectures

The lectures will be held at 3.10 pm on Mondays and Wednesdays in B17, Innova21. Printed lecture notes will be provided and discussed in the lectures. Additional material will be presented and discussed, so come along prepared to take additional notes. You are expected to have read the lecture material in advance of the lectures.

PDF files of the annotated lectures and supplementary handouts will be available from MyUni after each lecture.

Consulting

Tuesdays 11.30 am to noon starting in Week 2.

Tutorials and computing practicals

Will be held at 9.10 am on Wednesdays starting in Week 2. Tutorials will be held in the even weeks in EMG07 starting in Week 2. Computing practicals will be held in the odd weeks in EM126 starting in Week 3. We will be using the statistical package R in this course.
Assignments

There will be five (5) assignments, due by 3.10 pm on Wednesdays of Weeks 4, 6, 8, 10 and 12, respectively. The dates are: 18 August, 1 September, 15 September, 13 October, 27 October.

Examination and assessment

Your best four of five assignments will count 30% towards your final mark. The final three-hour exam will count 70% towards your final mark. The exam will be based on the work covered in the lectures, tutorials, computing practicals, assignments and any other set work.

Supplementary examinations

The Supplementary Examination will be held in December 2010. Make sure you refer to the University policy which can be found here http://www.adelaide.edu.au/student/exams/supps.html

Plagiarism

Please ensure that you sign and return to me with Assignment 1 the Plagiarism Declaration form for the course.

Course outline:

Chapter 1: Introduction to epidemiology and clinical trials: What is epidemiology? What are clinical trials? The role of randomization in clinical trials.


Chapter 3: Epidemiology. Cohort, case-control and related observations studies. The advantages and disadvantages of each type of study. Models for disease association: risk difference, relative risk, odds ratio, attributable risk. The analysis of binary outcomes for retrospective and prospective data.

Chapter 4: Statistical inference for $2 \times 2$ tables. The analysis of $2 \times 2$ tables and appropriate test procedures: Wald test; Likelihood Ratio test; profile likelihood. Conditional inference for $2 \times 2$ tables; Fisher’s Exact test.

Chapter 5: Review of tests based on the likelihood. Wald test; Likelihood ratio test; Score test.

Applications: to drugs trials, asthma, heart disease, cancer, HIV/AIDS, acute myeloid leukaemia and bioinformatics.

References and recommended reading:

General

  BSL Main Collection 610.72 A733s
This book covers most of the topics we will be studying in this course, and is recommended as the best general reference. If you wish to purchase a book, this is the one I recommend (it is also reasonably priced compared to many specialist texts).

  BSL Reference collection 610.3 A733e
  The Encyclopedia contains some excellent articles on clinical trials and epidemiology that you may find useful background reading.

**Clinical trials**


  BSL Main Collection 610.72 P581c
  An excellent general introduction to clinical trials.

  BSL Main Collection 615.1900287 P741c
  This is an older reference, but also a classic and remains an excellent introduction to the basics of clinical trials.

  I will be using this book for the section on crossover trials.

- *Group sequential methods with applications to clinical trials*, by C. Jennison and B. Turnbull. Chapman & Hall/CRC, 1999. BSL Main Collection 615.50724 J54g
  This is a harder and more specialized book, but will be useful if you end up designing and analysing clinical trials!

**Epidemiology**

  BSL Main Collection 614.40727 J592s
  This is a great introduction to epidemiology, and includes the topics we will cover in this course.

  BSL Main Collection 614.4072 C622s
  Another excellent book on epidemiology for statisticians.

**Statistical computing**

  BSL Main Collection 005.369 S111ZV.4

  BSL Reserve Collection 005.369 D142i
These books are held on Reserve in the Barr Smith Library, plus at least one other copy is available for short or normal loan.

Online access:
Handouts, lecture notes and other material for this course are available under the Course Material tab at http://www.myuni.adelaide.edu.au
Announcements about the course will also be made on MyUni and by email, so you should check both regularly.

Professor Patty Solomon
21 July 2010

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