



LUND UNIVERSITY  
Faculty of Medicine

Approved by FUN 27 January 2015, valid from 1  
January 2015

Research Programmed Board, FUN

## Applied Statistics II – Epidemiology and Health Science, METSEH2

3 credits

Third cycle

### General information

The course provides students with general knowledge of commonly used statistical methods that are applicable in research within epidemiology and health science. The course is intended for all doctoral students at the Faculty of Medicine whose research is mainly in these areas. *Applied Statistics I* or equivalent prior knowledge is required for admission to the course, along with basic skills in the statistical software the participant chooses to use during the course (see also *Teaching* below).

### Language of instruction

The language of the course will alternate between Swedish and English.

### Aim

The course is to provide practical knowledge of the best ways to manage and analyse empirical data in research projects within epidemiology and health science. The course will also prepare the participants for understanding and critically examining other empirical research in medical science, including outside their own field of research.

### Learning outcomes

On completion of the course, the student shall able to

- propose, perform, interpret, and critically review basic statistical analyses within each of the four different themes of the course: binary outcomes, correlation and regression, management of confounding effects and studies of reliability.

### Course content

The course covers four themes:

- 1) Design and analysis of studies of binary outcomes
  - Cohort and case-control studies. Power calculations.
  - Incidence and risk calculations
  - Association measurement. Odds ratios. Absolute and relative comparisons.
  - Simple problems of survival (time-to-event)

- Power calculations
- 2) Introduction to correlation and regression analysis
    - Spearman's and Pearson's regression correlation coefficients
    - Simple linear regression
    - Simple logistical regression
  - 3) Methods of managing confounding effects
    - Overview of different approaches
    - Overview of frequently used regression models
    - Multi-variable modelling with logistical regression
  - 4) Reliability analyses
    - Correlation versus agreement
    - Bland-Altman
    - Limits of agreement
    - ICC for continuous data
    - Kappa calculations for categorical data. Introduction to more advanced methods (E Svensson)

This advanced course in applied statistics, specialising in epidemiology (public health science) and health science, provides the participant with the necessary tools for planning, analysing and evaluating common types of observation studies within these research areas. Major emphasis is placed on regression methods as a way of managing confounding effects. The course provides students with an overview of frequently used regression models in this context, but will only address logistical regression in detail for the analysis of case control data. The course deals with the difference between relationship, correlation and agreement and provides an introduction to reliability analyses of both quantitative measurements and qualitative evaluation tools.

## Teaching

The course includes four and a half days of teaching, and five and a half days of independent study and project work. Days 1–4 are full days of lectures, group exercises and computer lab exercises. During the computer lab exercises, the students are to conduct analyses using a statistical software solution (SPSS, STATA, R, or SAS) in which they are well-versed from previous courses. The course requires that the student has access to a laptop with the selected software properly installed. Furthermore, on the basis of data retrieved from research within epidemiology or health science and set research questions, the participants are to write an analysis plan, perform, compile and present a statistical analysis in groups. Presentations will take place on the last day of teaching (half-day) in the form of a brief talk to the course management and other course participants.

Empirical examples presented during the course will largely be based on data available at Lund University. These examples will also be used in the courses *Epidemiology I – Introduction to Epidemiology* and *Epidemiology II – Design of Epidemiological Studies*.

## Assessment

The assessment is based on a take-home exam. A Pass on the course requires a Pass on the take-home exam, as well as a completed group assignment, including active participation in the discussions about their own group's and other groups' work.

## Grades

The grades awarded are Pass or Fail

## Reading list

Vittinghoff E, Glidden DV, Shiboski SC, McCulloch CE. *Regression Methods in Biostatistics*. Springer, 2nd edition, 2012. Sections 3.1–3.5, 4.1–4.4 and 5.1–5.4.  
(The book is available as an e-Book at Lund University)

Reference material for the themes on the design and analysis of binary outcomes (no. 1) is the same as for the course *Epidemiology I – Introduction to Epidemiology*:

Rothman KJ. *Epidemiology – An Introduction*. Oxford University Press, 2nd edition, 2012.

Articles covering the theme about reliability analyses (no. 4) will be provided in connection with the start of the course.