



DEPARTMENT OF MEDICAL EPIDEMIOLOGY AND BIostatISTICS

C8F3142, Biostatistics III: Survival Analysis for Epidemiologists, 1.5 credits (hec)

Biostatistik III: Överlevnadsanalys för epidemiologer, 1,5 högskolepoäng

Third-cycle level / Forskarnivå

Approval

This syllabus was approved by the The Committee for Doctoral Education on 2023-11-27, and was last revised on 2024-09-12. The revised course syllabus is valid from autumn semester 2024.

Responsible department

Department of Medical Epidemiology and Biostatistics, Faculty of Medicine

Prerequisite courses, or equivalent

Epidemiology I: Introduction to epidemiology, Biostatistics I: Introduction for epidemiologists and Biostatistics II: Logistic regression for epidemiologists or equivalent courses, and practical experience applying statistical models.

Purpose & Intended learning outcomes

Purpose

This course focuses on the application of survival analysis methods to epidemiological studies. The statistical software Stata will be used in the course.

Intended learning outcomes

After successfully completing this course students should be able to:

- propose a suitable statistical model for assessing a specific research hypothesis using data from a cohort study, fit the model using standard statistical software, evaluate the fit of the model, and interpret the results.
- explain the similarities and differences between Cox regression and Poisson regression.
- discuss the concept of timescales in statistical models for time-to-event data, control for different timescales using standard statistical software, and argue for an appropriate timescale for a given research hypothesis.

- discuss the concept of confounding in epidemiological studies and control/adjust for confounding using statistical models.
- apply and interpret appropriate statistical models for studying effect modification and be able to reparameterise a statistical model to estimate appropriate contrasts.
- critically evaluate the methodological aspects (design and analysis) of a scientific article reporting a cohort study.

Course content

This course introduces statistical methods for survival analysis with emphasis on the application of such methods to the analysis of epidemiological cohort studies. Topics covered include methods for estimating survival (life table and Kaplan-Meier methods), comparing survival between subgroups (log-rank test), and modelling survival (primarily Poisson regression and the Cox proportional hazards model). The course addresses the concept of 'time' as a potential confounder or effect modifier and approaches to defining 'time' (e.g., time since entry, attained age, calendar time). The course will emphasise the basic concepts of statistical modelling in epidemiology, such as controlling for confounding and assessing effect modification

Forms of teaching and learning

Lectures, exercises focusing on analysis of real data using statistical software, exercises not requiring statistical software, group discussions, literature review.

Language of instruction

The course is given in English

Grading scale

Pass (G) /Fail (U)

Compulsory components & forms of assessment

Compulsory components

The individual examination (summative assessment).

Forms of assessment

The course grade is based solely on a written examination. The examination will contain two sections and a passing grade must be obtained for each section in order to obtain a passing grade for the course. Students who do not obtain a passing grade on both sections and wish to take the examination again must retake the entire examination (i.e., both sections) even if they previously obtained a passing grade on one of the two sections. The focus of the exam will be on understanding concepts and their application to analysis of epidemiological studies rather than mathematical detail.

Students who do not obtain a passing grade in the first examination will be offered a second

examination within 2 months of the final day of the course. Students who do not obtain a passing grade at the first two examinations will be given top priority for admission the next time the course is offered. If the course is not offered during the following two academic terms then a third examination will be scheduled within 12 months of the final day of the course.

Course literature

We have not assigned any compulsory texts since experience has shown that course participants have widely varying preferences. We will provide extensive course notes and many participants do not find a great need for additional texts. A large number of textbooks are available and we suggest students interested in additional reading to identify a textbook at a technical level suitable for them. Many general textbooks in medical statistics contain a chapter on survival analysis.

This course has a heavy emphasis on application rather than theory. Very few books are targeted at epidemiologists (e.g., you won't find Poisson regression mentioned in many books). The definitive text for epidemiologists is Breslow and Day (1987) although it is rather advanced. The text by Cleves et al (2010) is highly recommended as it covers both the technical details as well as implementation in Stata.

Recommended texts

Cleves M et al. An Introduction to Survival Analysis Using Stata, 3rd edition. College Station: Stata Press; 2010.

Breslow NE, Day NE. Statistical Methods in Cancer Research Volume II: The Design and Analysis of Cohort Studies. IARC Scientific Publication No. 82; 1987. Free to download from: <https://publications.iarc.fr/Book-And-Report-Series/Iarc-Scientific-Publications/Statistical-Methods-In-Cancer-Research-Volume-II-The-Design-And-Analysis-Of-Cohort-Studies-1986>

Hills M and De Stavola B. A Short Introduction to Stata for Biostatistics, 2nd edition. Timberlake Consultants Ltd; 2012