



INSTITUTE OF ENVIRONMENTAL MEDICINE

C6F2959, Fundamentals of Statistical Modeling, 1.5 credits (hec)

Fundamentala principer för statistisk modellering, 1,5 högskolepoäng

Third-cycle level / Forskarnivå

Approval

This syllabus was approved by The Committee for Doctoral Education on 2023-11-10, and was last revised on 2026-02-18. The revised course syllabus is valid from autumn semester 2026.

Responsible department

Institute of Environmental Medicine, Faculty of Medicine

Prerequisite courses, or equivalent

Courses ""Epidemiology I: Introduction to epidemiology"", ""Epidemiology II: Design of epidemiological studies"", ""Biostatistics I: Introduction for epidemiologists"", ""Biostatistics II: Logistic regression for epidemiologists"" and ""Biostatistics III: Survival analysis for epidemiologists"" or corresponding courses.

Purpose & Intended learning outcomes

Purpose

The purpose of this advanced course is to provide an introduction to the tools of statistical modeling.

Intended learning outcomes

After successfully completing this course the students should be able to do the following independently of others:

- explain the concepts of marginal and conditional distributions,
- illustrate the relationship between cumulative distribution, probability mass/density, quantile, sparsity, cumulative hazard, and hazard functions,
- propose possible models for the above functions both marginally and conditionally on covariates,

- identify suitable models to answer scientific research questions and motivate the choice,
- estimate the parameters of the above functions, and
- use standard statistical software, evaluate the fit of the model, and critically interpret the results.

Course content

The students are introduced to a general framework for data analyses that hinges on creating statistical models. The course focuses on the intricacies and potentials of modeling in a number of examples and real-data applications. The range of the covered examples is broad, and some examples are worked out in greater details than others. The course will enable students to gain an advanced knowledge of (1) random variables, (2) joint and conditional probability distributions, (3) modeling tools, (4) interpretation of statistical models, (5) relations between known methods, (6) estimation tools, (7) computer programming. The students will improve the level of knowledge of the foundations for data analysis, statistical practice, and use of statistical software. They will also be prepared to pursue more advanced studies in statistics. The focus of the course is on analysis of real data and interpretation.

Forms of teaching and learning

The course activities are based on lectures and computer exercises, exercises not requiring statistical software, and 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

Individual written examination based on practical application of the course content, where the student has to show that all the intended learning outcomes have been achieved.

Students who do not obtain a passing grade in the first examination will be offered a second examination occasion within two months of the final day of the course.

Students may be granted additional examination sessions, up to six in total, subject to discussion with and approval by the examiner.

Course literature

There is no required literature. Lecture notes will be provided at the start of the course.