Statistical Methods

Single subject and programme course

6 credits

Statistical Methods

732A93

Valid from: 2016 Autumn semester

Determined by
The Quality Board at the Faculty of Arts
and Sciences

Date determined
2016-04-13

Offered for the last time
Autumn semester 2023

Replaced by
732A83

Main field of study

Statistics

Course level

Second cycle

Advancement level

A1N

Course offered for

- Master's Programme in Statistics and Machine Learning

Entry requirements

- Bachelor's degree equivalent to a Swedish Kandidatexamen of 180 ECTS credits in one of the following subjects:
    - statistics
    - mathematics
    - applied mathematics
    - computer science
    - engineering
- Passed courses in
    - calculus
    - linear algebra
    - statistics
    - programming
- English corresponding to the level of English in Swedish upper secondary education (Engelska 6)
    Exemption from Swedish

Intended learning outcomes

After completion of the course the student should be able to:

- use knowledge of the common statistical distributions for building statistical models,
- apply main principles within point estimation, interval estimation and hypothesis testing,
- demonstrate a good understanding of the main concepts of Bayesian analysis,
- build linear regression models, check their uncertainty and perform model comparison,
- apply methods for sampling from large finite populations,
- apply the basic imputation methods for model building and estimation.
- present the underlying mathematical models for the above methods and perform theoretical calculations with these models.

Course content

The course incorporates a wide collection of the most important concepts and methods in statistics.

The course covers:

- concept of probability,
- random variable, common statistical distributions and their properties,
- point- and interval estimation,
- hypothesis testing,
- simple and multiple linear regression, t-test and F-test; Residual and outlier analyses,
- likelihood, prior and posterior distribution, and Bayes theorem,
- concept of Markov chains,
- sampling with and without replacement,
- imputation for model building.

Teaching and working methods

The teaching comprises lectures, seminars, and computer exercises complemented by self-studies. The lectures are devoted to presentations of concepts, theories and methods. The computer exercises provide practical experience of statistical analysis. The seminars comprise presentations and discussions of various assignments.

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Examination

Written reports on home assignments. One final written examination. Detailed information about the examination can be found in the course's study guide.

If the LiU coordinator for students with disabilities has granted a student the right to an adapted examination for a written examination in an examination hall, the student has the right to it. If the coordinator has instead recommended for the student an adapted examination or alternative form of examination, the examiner may grant this if the examiner assesses that it is possible, based on consideration of the course objectives.

Students failing an exam covering either the entire course or part of the course twice are entitled to have a new examiner appointed for the reexamination.

Students who have passed an examination may not retake it in order to improve their grades.

Grades

ECTS, EC

Other information

Planning and implementation of a course must take its starting point in the wording of the syllabus. The course evaluation included in each course must therefore take up the question how well the course agrees with the syllabus.

The course is carried out in such a way that both men´s and women´s experience and knowledge is made visible and developed.

Department

Institutionen för datavetenskap