Statistical Methods

Statistiska metoder
6 credits

Programme course

732A93

Valid from: 2023 Autumn semester

Determined by	**Main field of study**	
The Quality Board at the Faculty of Arts and Sciences	Statistics	
Date determined	**Course level**	**Progressive specialisation**
2016-04-13	Second cycle	A1N
Revised by	**Disciplinary domain**	
Course and Programme Syllabus Board at the Faculty of Arts and Sciences	Natural sciences	
Revision date	**Subject group**	
2022-06-07	Statistics	
Offered first time	**Offered for the last time**	
Autumn semester 2016	Autumn semester 2023	
Department	**Replaced by**	
Institutionen för datavetenskap	732A83	

Course offered for

- Master's Programme in Statistics and Machine Learning

Entry requirements

- Bachelor's degree equivalent to a Swedish Kandidatexamen within statistics, mathematics, applied mathematics, computer science, engineering or a similar degree.
- Completed courses with passing grade in following subjects:
  - 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:

- explain and apply the common statistical distributions for building statistical models
- apply main principles within point estimation, interval estimation and hypothesis testing
- demonstrate and apply the main concepts of Bayesian analysis
- apply 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
- critically discuss the fulfillment of the models' assumptions
- carry out tasks within given time frames

Course content

The course covers:

- concept of probability
- random variable, common statistical univariate and multivariate distributions and their properties, central limit theorem
- point estimation – properties and methods
- interval estimation
- hypothesis testing
- simple and multiple linear regression; least squares estimation; residual and outlier analyses
- likelihood, prior and posterior distribution, and Bayes theorem
- imputation for model building

Teaching and working methods

The teaching comprises lectures, seminars, and computer exercises complemented by self-studies.

Examination

The course is examined by:

- individual written examination, grade scale: EC
- individual written rapport on computer assignments, grading scale: EC: P/F

The final grade for the course is based on grade from the written examination and requires an approved rapport on computer assignments.

Detailed information can be found in the study instructions.

If special circumstances prevail, and if it is possible with consideration of the nature of the compulsory component, the examiner may decide to replace the compulsory component with another equivalent component.

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 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.

An examiner may also decide that an adapted examination or alternative form of examination if the examiner assessed that special circumstances prevail, and the examiner assesses that it is possible while maintaining the objectives of the course.

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 conducted in such a way that there are equal opportunities with regard to sex, transgender identity or expression, ethnicity, religion or other belief, disability, sexual orientation and age.

If special circumstances prevail, the vice-chancellor may in a special decision specify the preconditions for temporary deviations from this course syllabus, and delegate the right to take such decisions.