SF1916 Probability Theory and Statistics 6.0 credits

Sannolikhetsteori och statistik

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for SF1916 valid from Autumn 2018

Grading scale

A, B, C, D, E, FX, F

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Basic linear algebra, calculus in one variable, calculus in several variables.

Only for students enrolled in the Degree Programme in Design and Product Realisation (CDEPR).

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

To pass the course, the student should be able to do the following:

- construct elementary statistical models for experiments
- describe standard models and account for the applicability of the models in given examples
- define and calculate descriptive quantities for probability distributions and data sets, such as measures of central tendency, dispersion and dependence
- using standard methods, such as maximum likelihood estimation and the method of least squares, calculate estimates of unknown quantities and quantify the uncertainty in these estimates by means of for example error propagation and confidence intervals
- value and compare methods of estimation, for example with respect to bias and efficiency
- analyse how measuring accuracy affects conclusions and quantify risks and error probabilities in statistical hypothesis testing

To receive the highest grade, the student should in addition be able to do the following:

- Combine all the concepts and methods mentioned above in order to solve more complex problems.

Course contents

Basic concepts such as probability, conditional probability and independent events. Discrete and continuous random variables, in particular one dimensional random variables. Measures of central tendency, dispersion and dependence of random variables and data sets. Common distributions and models, such as the normal, binomial and Poisson distributions. The Central limit theorem and the Law of large numbers.

Descriptive statistics.

Point estimates and general methods of estimation, such as maximum likelihood estimation and the method of least squares. General confidence intervals and in particular confidence intervals for the mean and variance of normally distributed data. Confidence intervals for proportions and for difference in means and proportions.

Statistical hypothesis testing. Chi2-tests of goodness of fit, homogeneity and independence. Linear regression.

Course literature

Blom et al., Sannolikhetsteori och statistikteori med tillämpningar, Studentlitteratur

Complemental material from the department.

Examination

- TEN1 - Examination, 6.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Other requirements for final grade

Passed written examination.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.