SF2950 Applied Mathematical Statistics 7.5 credits

Tillämpad matematisk 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 SF2950 valid from Spring 2011

Grading scale

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

Education cycle

Second cycle

Main field of study

Mathematics

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:

- analyse and model real data with statistical computer software
- analyse and apply the theory of the general linear model on real problems by estimating the parameters in the general model and quantify the uncertainty in those estimates and determine how this affect the conclusions when testing statistical hypothesis
- perform multiple regression analysis and determine the applicability of the model on a real problem
- Understand problems with observed data, such as simultaneity and sample selection bias, and know how to use instrumental variables.
- perform a one and two sided variance analysis and distinguish between systematic and random factor models in real modelling situations
- analyse and judge different choices of experimental plans, i.e., distinguish between completely randomised experiments, randomised blocks and Latin squares when planning and modelling experiments. Judge the applicability of randomised and stratified sampling.
- apply full and fractional 2k designs on concrete problems
- decide and apply nonparametric methods on real problems based on different modelling aspects

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

Theory of the common linear model: Estimation, confidence intervals and hypothesis testing.

Regression analysis: Multiple regression analysis.

Modelling: selection bias, simultaneity, heteroskedasticity, multikollinearity and estimation methods for such problems. The LOGIT model.

Variance analysis: One, two and multi way variance analysis, hierarchical splitting. Systematical and stochastic components.

Experimental planning: Factor trial, totally randomised tests, randomised blocks, Latin squares totally and fractional 2k-experiments.

Sample theory: Simple random samples, stratified samples.

Statistical quality control: Differentiating and guided control.

Non parametric methods.

Specific prerequisites

Previous knowledge is assumed equivalent to Mathematical Statistics SF1906 (5B1506) and Linear Algebra SF1604 (5B1109).

Course literature

Material from the department.

Examination

- LAB1 - Laboratory Work, 1.5 credits, grading scale: P, F
- 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

Assignment (LAB1; 1,5 university credits), written exam (TEN1; 6 university credits).

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.