SF1911 Statistics for Bioengineering 6.0 credits

Statistik för bioteknik

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 SF1911 valid from Autumn 2016

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Linear algebra, calculus in one variable, numerical methods,capability for writing code in Matlab.

Language of instruction

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

Intended learning outcomes

This course presents the most important practical statistical methods used in bioengineering and biomedical engineering while implementing software that engineers are familiar with.

This course focuses primarily on the practical aspects of statistics in biotechnology. Computer-aided exercise work with a variety of datasets forms an essential learning activity.

Having passed the course, the student should be able to do the following:

- can use basic concepts of probability and statistics.
- be able to describe statistical methods and probability distributions relevant for bioengineering data.
- judge the applicability and limitations of different statistical methods.
- be able to perform and interpret statistical analyses with bioengineering data.
- apply standard models and explain the applicability of the models in given bioengineering examples
- define and compute descriptive quantities like expectation, variance, and percentiles for distributions and data sets.with standard methods like Maximum likelihood and lest squares calculate estimates of unknown quantities and quantify the uncertainty in these estimates
- evaluate and compare methods of estimation
- analyse how measuring accuracy affect conclusions and quantify risks and error probabilities when testing statistical hypothesis

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

- construct elementary statistical models for practical engineering problems in bioengineering when applicable
- Combine all the concepts and methods mentioned above in order to solve more complex problems.

Course contents

- Data and Descriptive Statistics
- Probability Distributions as Models for Observations
- Normal Distribution, Expenetial distribution, Poisson distrubution
- Bayes formula
- Estimation and Testing Statistical Hypothesis, Confidence intervals, p-values
- Two Sample Problems,
- Chi-square test of fit
- Odds ratios

- One- and Two-Way ANOVA.

Design of Experiments

Disposition

Lectures, exercise classes, work with computer -aided data analysis

Course literature

Brani Vidakovic: Statistics for Bioengineering Sciences With Matlab and WinBugs Support. Springer Verlag 2011 ISBN 978-1-14614-0393-7, e-ISBN 978-1-4614-0394-4

Hand-outs 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.

The written exam deals with concepts examined with multiple choice questions and problems with short calculations.

Computer exercises giving credit, a quiz.

Other requirements for final grade

The written exam, computer laboratory work.

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.