

Mathematical Statistics, First Course

Programme course

6 credits

Matematisk statistik

TAMS28

Valid from: 2017 Spring semester

Determined by

Board of Studies for Chemistry, Biology
and Biotechnology

Date determined

2017-01-25

Main field of study

Mathematics, Applied Mathematics

Course level

First cycle

Advancement level

G2X

Course offered for

- Engineering Biology, M Sc in Engineering
- Chemical Biology, M Sc in Engineering

Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites

Algebra and calculus, especially matrix algebra, differentiation, integration and power series.

Intended learning outcomes

The aim of the course is to give an introduction to probability and statistics, i.e. both to introduce theoretical probability models and to provide methods for statistical inference based on observed data. By the end of the course, the student should be able to:

- describe and use models for phenomena influenced by random factors and calculate probabilities;
- use random variables and their properties to describe and explain random variation, use a probability mass function or a density function to calculate probabilities, expected values, variances etc;
- apply an appropriate probability model to describe and analyse observed data and draw conclusions concerning interesting parameters by using point estimation, confidence intervals and hypothesis testing;
- analyse the relationships between two or several variables by using simple or multiple linear regression models and discuss the adequacy of the models;
- use probability models and statistical methods in applications from science and engineering and evaluate the results;
- use software for certain types of statistical analyses.

Course content

Probability: Sample spaces, events and probability. Conditional probability. Independent events. Random variables, expected value, variance and standard deviation; especially normal, exponential, binomial and Poisson distribution. The central limit theorem.

Statistics: Methods for parameter estimation. Confidence intervals in connection with one or several samples from the normal distribution, for proportions, in connection with the Poisson distribution etc. Tests of hypothesis in particular chisquare tests. Simple and multiple linear regression. Histograms.

Teaching and working methods

Teaching consists of lectures, lessons and obligatory computer exercises.

Examination

LAB1	Computer Exercises	1 credits	U, G
TEN1	Written examination	5 credits	U, 3, 4, 5

Grades

Four-grade scale, LiU, U, 3, 4, 5

Other information

Supplementary courses: Biostatistics, Signal and Image Processing.

Department

Matematiska institutionen

Director of Studies or equivalent

Ingegerd Skoglund

Examiner

Zhengxia Liu

Course website and other links

<http://courses.mai.liu.se/GU/TAMS28>

Education components

Preliminary scheduled hours: 56 h

Recommended self-study hours: 104 h

Course literature

Montgomery, D.C., Runger, G.C., Hubele, N.F., Engineering Statistics, 5th Edition
Formel- och tabellsamling i matematisk statistik utgiven av matematiska
institutionen. Exempelsamling.

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.