Probability and Statistics, first course

Programme course

6 credits

Sannolikhetslära och statistik, grundkurs

TAMS11

Valid from: 2017 Spring semester

Determined by
Board of Studies for Mechanical Engineering and Design

Date determined
1017-01-25

Main field of study
Mathematics, Applied Mathematics

Course level
First cycle

Advancement level
G2F

Course offered for
- Computer Engineering, B Sc in Engineering
- Design and Product Development
- Mechanical Engineering, M Sc in Engineering
- Physics and Nanotechnology
- Energy-Environment-Management
- Protein Science, Master's programme
- Mechanical Engineering, Master's programme
- Engineering Electronics
- Chemical Analysis Engineering, B Sc in Engineering
- Computer Science, Master's Programme

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
Analysis, algebra, differential and integral calculus, power series and differential equations.

Intended learning outcomes

The aim of the course is to give an introduction to probability and statistics, i.e. to introduce theoretical probability models and to give 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 an appropriate probability model to describe and analyse observed data and draw conclusions concerning interesting parameters;
- find point estimators of parameters and analyse their properties;
- understand the principles of statistical inference based on confidence intervals and hypothesis testing;
- derive confidence intervals and test hypotheses using observed data, draw conclusions and describe the uncertainty.

Course content

Probability theory: Sample space, events and probabilities. Combinatorics. Conditional probabilities and independent events. Discrete and continuous random variables, their probability distributions, expectations and variances. Normal, exponential, binomial, Poisson distributions etc. The Central Limit Theorem. Statistics: Point estimation. Properties of estimators. The method of maximum likelihood, the method of moments and the least squares estimation. Confidence intervals. Testing statistical hypotheses. Simple linear regression.

Teaching and working methods

Teaching consists of lectures, lessons and obligatory computer exercises.

Examination

UPGA	Exercise	1 credits	U, G
TENB	Written Examination	5 credits	U, 3, 4, 5

Grades

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

Department

Matematiska institutionen

Director of Studies or equivalent

Ingegerd Skoglund

Examiner
Xiangfeng Yang

Course website and other links
http://courses.mai.liu.se/GU/TAMS11

Education components
Preliminary scheduled hours: 56 h
Recommended self-study hours: 104 h

Course literature
Jay L. Devore: Probability and Statistics for Engineering and the Sciences

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://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.