

# Probability and Statistics, First Course

Programme course

6 credits

Sannolikhetslära och statistik, grundkurs

TAMS42

Valid from: 2019 Spring semester

**Determined by**

Board of Studies for Computer Science  
and Media Technology

**Date determined**

2018-08-31

## Main field of study

Mathematics, Applied Mathematics

## Course level

First cycle

## Advancement level

G2X

## Course offered for

- Computer Science and Engineering, 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

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. Linear and logistic regression.

## Teaching and working methods

Teaching consists of lectures, lessons and obligatory computer exercises.

## Examination

UPG1	Computer exercises	2 credits	U, G
TEN1	Written examination	4 credits	U, 3, 4, 5

## Grades

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

## Department

Matematiska institutionen

## Director of Studies or equivalent

Nils-Hassan Quttineh

## Examiner

Xiangfeng Yang

## Course website and other links

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

## Education components

Preliminary scheduled hours: 50 h

Recommended self-study hours: 110 h

## Course literature

### Books

Jay L. Devore, (2011) *Probability and Statistics for Engineering and the Sciences*  
8 Brooks/Cole  
ISBN: 9780840068279

### Other

*Formel- och tabellsamling i Matematisk statistik*