

# Probability Theory

Single subject and programme course

6 credits

Sannolikhetssteori

732A63

Valid from: 2016 Autumn semester

**Determined by**

The Quality Board at the Faculty of Arts  
and Sciences

**Date determined**

2016-09-30

## Main field of study

Statistics

## Course level

Second cycle

## Advancement level

A1N

## Course offered for

- Masters Programme in Statistics and Machine Learning

## Entry requirements

- Bachelor's degree equivalent to a Swedish Kandidatexamen of 180 ECTS credits in one of the following subjects:
  - statistics
  - mathematics
  - applied mathematics
  - computer science
  - engineering
- Completed courses in
  - calculus
  - linear algebra
  - statistics
  - machine learning
  - programming
- English corresponding to the level of English in Swedish upper secondary education (Engelska 6/B)  
(Exemption from Swedish)

## Intended learning outcomes

After completion of the course, the students shall be able to:

- use the major univariate and multivariate probability distributions in solving theoretical and practical problems in probability
- derive probability distributions of functions of random vectors
- analyze probability models by moment generating functions and other transforms
- analyze probability models by conditioning
- account for basic modes of stochastic convergence and derive limit distributions.

## Course content

The course provides a theoretical foundation for models and methods based on the concept of probability. The course comprises:

- probability distributions for univariate and multivariate random variables,
  - expected value, variance, moments,
  - joint distribution, conditional distribution, independence,
  - the elements of the Bayesian approach,
  - transforms,
  - order statistics,
  - multivariate normal distribution and its properties,
  - types of convergence and convergence theorems.

## Teaching and working methods

The course consists of lectures and exercise sessions. The lectures are devoted to presentations of theories, concepts and methods. Mathematically oriented problems are solved in the exercise sessions.

Homework and independent study are a necessary complement to the course.

Language of instruction: English.

## Examination

Written examination.

Detailed information about the examination can be found in the course's study guide.

If the LiU coordinator for students with disabilities has granted a student the right to an adapted examination for a written examination in an examination hall, the student has the right to it. If the coordinator has instead recommended for the student an adapted examination or alternative form of examination, the examiner may grant this if the examiner assesses that it is possible, based on consideration of the course objectives.

Students failing an exam covering either the entire course or part of the course twice are entitled to have a new examiner appointed for the reexamination.

Students who have passed an examination may not retake it in order to improve their grades.

## Grades

ECTS, EC

## Other information

Planning and implementation of a course must take its starting point in the wording of the syllabus. The course evaluation included in each course must therefore take up the question how well the course agrees with the syllabus.

The course is carried out in such a way that both men's and women's experience and knowledge is made visible and developed.

Department  
Institutionen för datavetenskap