



# SF2940 Probability Theory 7.5 credits

## Sannolikhetsteori

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 SF2940 valid from Autumn 2007

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Mathematics

## Specific prerequisites

Basic knowledge in Mathematical Statistics, Fourier Analysis and Linear Algebra.

## Language of instruction

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

## Intended learning outcomes

To pass the course, the student should be able to do the following:

- define and apply basic concepts and methods of probability theory
- use common probability distributions and analyse their properties (exponential distribution, multivariate normal distribution, etc.)
- compute conditional probability distributions and conditional expectations
- solve problems and compute limits of distributions by use of transforms (characteristic functions, generating functions)
- define and use the properties of Stochastic processes, especially random walks, branching processes, the Poisson and Wiener process, applied to real problems
- explain the concept of measurability and define and work with sigma algebras and construct probability measures on sample spaces

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

- Combine all the concepts and methods mentioned above in order to solve more complex problems.

## Course contents

The basic concepts of probability theory. Measurability and sigma algebras. Characteristic functions and generating functions. Convergence of probability distributions, the Central Limit Theorem. Convergence of random variables. The Law of Large Numbers. Multivariate Normal distributions. Conditional distributions. Stochastic processes: Random walks, Branching processes, Poisson processes. Wiener processes (Brownian motion).

## Course literature

Gut, A.: An intermediate course in Probability Theory. Springer Verlag (1995).

Complemental material from the department.

## Examination

- TEN1 - Examination, 7.5 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.

## 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.