



FSF3945 Advanced Probability

7.5 credits

Avancerad 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 FSF3945 valid from Spring 2019

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Master's degree in mathematics, applied mathematics or related field including at least 30 ECTS in mathematics.

Completed course in SF3940 or corresponding.

Language of instruction

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

Intended learning outcomes

After completing the course students are expected to:

- explain the connection between random walks and the heat equation
- explain in detail the properties of the Brownian motion
- have a good understanding of weak convergence in metric spaces
- outline the construction of the Brownian motion (Donsker's theorem) from random walks
- explain the main results and applications of ergodic theory
- have basic insights in additional topics (that may vary between years) in advanced probability
- be able to solve problems related to the theory

Course contents

1. Random walks and the heat equation
2. Infinite divisibility
3. Large deviations
4. Weak convergence I
5. Weak convergence
6. Brownian motion
7. Ergodic theory

Disposition

The course will consist of roughly bi-weekly discussion meetings (not standard lectures) where students present and discuss the material as well as some weekly exercises. The topic for each meeting is given below.

Course literature

1. Greg Lawler, Random walk and the heat equation.
2. Rick Durrett, Probability: Theory and Examples, 4th Edition, Cambridge Series in Statistical and Probabilistic Mathematics, 2010. ISBN 9780521765398
3. Patrick Billingsley, Probability and Measure, 3rd Edition, Wiley.
4. Patrick Billingsley, Convergence of Probability Measures, Wiley.

Examination

- HEM1 - Home assignments, 3.5 credits, grading scale: P, F
- TENM - Oral exam, 4.0 credits, grading scale: P, 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.

The examination will be done as a combination of homework and oral exam.

Other requirements for final grade

Homework and oral exam.

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.