SF2970 Martingales and Stochastic Integrals 6.0 credits

Martingaler och stokastiska integraler

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 SF2970 valid from Autumn 2007

Grading scale

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

Education cycle

Second cycle

Main field of study

Mathematics

Specific prerequisites

SF2940 (5B1540) Probability theory.

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:

- Be able to define and account for conditional expectation, filtrations and the martingale property in discrete and continuous time.
- Account for the properties of the Brownian motion (Wiener process), with applications.
- Define and account for Itô's stochastic integrals, the Itô lemma, Girsanov transform, the Martingale Representation Theorem and random time-change of Itô integrals in concrete situations.
- Account for and determine strong and weak solutions of stochastic differential equations of Itô type (diffusion processes).
- Account for and determine stochastic representations of solutions of parabolic partial differential equations (Kolmogorov's forward and backward equations, the Feynman-Kac and Dynkin's formulas).

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

Discrete and Continuous-time martingales, Wiener process, Stochastic integrals, Itô's lemma, Stochastic differential equations, exponential martingales, Girsanov transformation and its applications, Random time changes.

Course literature

Djehiche Boualem: Stochastic Calculus, An Introduction with Applications. Compendium from KTH.
Complemental material from the department.

Examination

- TEN1 - Examination, 6.0 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.

Other requirements for final grade

Written examination (6 university credits)

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.