FSF3971 Optimal Stochastic Control and Backward Stochastic Differential Equations 7.5 credits

Optimal stokastisk kontroll och bakåt stokastiska differentialekvationer

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for FSF3971 valid from Autumn 2015

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

A Master's degree in mathematics, applied mathematics or related field including at least 30 ECTS in mathematics and SF3940 Probability.

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 the students are expectedto

- Explain the dynamic programming principle and its connection to partialdifferential equations
- Have a good understanding of the maximumprinciple
- Haveagoodunderstandingofbackwardstochasticdifferentialequations.
- Outline the foundations mean-field games and its relation to control andBSDEs
- Explain and motivate the methods in differentapplications
- Be able to solve problems and discuss research questions related to thetheory.

Course contents

1. Optimal control. Dynamic programming, the HJB Equation, the maximum principle
2. Backward stochastic differential equations.
3. Forward-backward stochastic differential equations. Duality.
4. Mean-field type control
5. Mean-field games
6. Applications

Disposition

Weekly lectures

Course literature

The literature consists of a draft of the following book:

T. Basar, B. Djehiche and H. Tembine (2014-2017), Mean-Field-Type Game: Foundations and New Directions

Examination

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.

If the course is discontinued, students may request to be examined during the following two academic years.

Homework and an oral exam

Other requirements for final grade

Homework and an 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.