האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

Syllabus

Stochastic Calculus - 80932

Last update 28-10-2015

HU Credits: *3*

Responsible Department: *Mathematics*

Academic year: *0*

Semester: *2nd Semester*

Teaching Languages: *English and Hebrew*

Campus: *E. Safra*

Course/Module Coordinator: *Prof. Yuri Kifer*

Coordinator Email: *kifer@math.huji.ac.il*

Coordinator Office Hours: *By appointment.*

Teaching Staff:
Prof Yuri Kifer

Course/Module description:
Brownian motion and its properties. Martingales. Stochastic integrals. Stochastic

differentials and Ito's formula. Levy characterization of the Brownian motion. Martingale representation theorem. Stochastic differential equations. Diffusions. Markov and strong Markov property. Generators of Markov semi-groups and Kolmogorov equations. Feynman-Kac formula. Cameron-Martin-Girsanov theorem. Levy processes. Probabilistic solutions of boundary value problems. Applications to optimal stopping and to mathematical finance.

Course/Module aims:

Same as in learning outcomes.

Learning outcomes - On successful completion of this module, students should be able to:

To learn about Stochastic Analysis which is one of the important fields in Probability Theory, with applications in many fields in Probability Theory and Physics, as well as in Engineering and Financial Mathematics.

Familiarity with concepts such as Brownian Motion, Martingales, Stochastic Integrals, and others.

To learn the Markov and strong Markov properties and their applications.

To learn about probabilistic solutions of boundary value problems.

To learn about applications to optimal stopping and mathematical finance.

Attendance requirements(%):

100

Teaching arrangement and method of instruction: Lecture

Course/Module Content:

Brownian motion and its properties. Martingales. Stochastic integrals. Stochastic differentials and Ito's formula. Levy characterization of the Brownian motion. Martingale representation theorem. Stochastic differential equations. Diffusions. Markov and strong Markov property. Generators of Markov semi-groups and Kolmogorov equations. Feynman-Kac formula. Cameron-Martin-Girsanov theorem. Levy processes. Probabilistic solutions of boundary value problems. Applications to optimal stopping and to mathematical finance.

Required Reading:
N/A

Additional Reading Material:
Yu. Kifer, Introduction to Stochastic Calculus, Lecture Notes.

B. Oksendal, Stochastic Differential Equations, 6th ed., Springer 2003

I. Karatzas and S.E. Shreve, Brownian Motion and Stochastic Calculus, Springer, 1988&1991

Course/Module evaluation:
End of year written/oral examination 0 %
Presentation 0 %
Participation in Tutorials 0 %
Project work 100 %
Assignments 0 %
Reports 0 %
Research project 0 %
Quizzes 0 %
Other 0 %

Additional information:
none