Math 510

Stochastic Analysis II

MWF: Time and room - TBA **Winter 2018**

Instructor: Professor Alexander Melnikov

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Syllabus:

The main aim of this course is to give an accessible introduction to the main ideas, methods and techniques of stochastic analysis/stochastic calculus in continuous time targeted to mathematical finance. Many important notions, results and facts from stochastic analysis are presented in an appropriately simplified manner. Another important goal of the course is to present interconnections among disciplines of stochastic analysis and mathematical finance and to encourage students to further study of the subject.

The course will cover:

Wiener and Poisson processes and their properties. Martingales, and related notions and facts: stopping times and their structure, predictability and the Doob-Meyer decomposition of submartingales. Semimartingales.

Stochastic integration with respect to a Wiener process and semimartingales with further exposition of key formulas and important facts as building blocks and powerful techniques for mathematical finance: changing of variables (Ito's formula), changing of measure (Girsanov's formula), martingale representations and decompositions.

Stochastic differential equations. Existence and uniqueness of strong solutions and related things, including financial market modelling.

Prerequisite: Math 505 "Stochastic Analysis I" or consent of the Department.

Recommended textbook:

S. N. Cohen, R. J. Elliott, Stochastic Calculus and Applications, Springer/Birkhauser, 2015.

Grading:

Final exam 50%, Midterm exam 30% (Exams are closed-book).

Homework/Project 20%.