Fall 2005

MATH 7380-1: Applied Stochastic Analysis

Time: MWF 2:40–3:30

Room: Lockett 111

Prerequisite

Math 3355 Probability
Math 4031 Advanced Calculus

Textbook

Kuo, H.-H.: Introduction to Stochastic Integration. (to appear in the Universitext Series, Springer-Verlag, 2005)

Coverage

We will study the basic theory of stochastic integration with several applications to finance and other fields. Many concrete examples will be used to motivate the concepts and theorems. We will assume background of elementary probability theory and advanced calculus. Basic knowledge of measure theory and Hilbert space will be helpful, but not absolutely necessary. Below are some topics to be covered:

1. Brownian motion
2. Construction of Brownian motion
3. Wiener integrals
4. Itô's integrals
5. Stochastic integrals for martingales
6. The Itô formula
7. Girsanov theorem
8. Wiener-Itô theorem
9. Stochastic differential equations
10. Hedging portfolio
11. Arbitrage and option pricing
12. Black-Scholes analysis

Reference

Øksendal, B.: Stochastic Differential Equations. Fifth edition, Springer, 2000

Grading

The grade will be determined by homework assignments (65%) and the final exam (35%) with the tentative scale: A 90%; B 80%; C 70%

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