Spring 2004

MATH 7390-3: Stochastic Analysis and Advanced Topics

Time: MWF 1:40–2:30

Room: Lockett 113

Prerequisite

Math 7311 (Real Analysis I) or equivalent

Coverage

This course contains two parts: (1) basic theory of stochastic integration with applications to mathematical finance (which appeals to finance students and non-probability math graduate students), (2) advanced research topics for Ph.D. students (which I will outline in an overview for further independent study). Below are some items to be covered in this course:

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. Stochastic differential equations
9. Arbitrage and option pricing
10. Black-Scholes analysis
11. Wiener-Itô decomposition theorem
12. White noise theory

References

The main references will be the first two books below, which are for part (1) of the coverage. For part (2) we will use the other two books.

1. Kuo, H.-H.: Introductory Stochastic Integration. (In preparation)
2. Oksendal, B.: Stochastic Differential Equations. 5th edition, Springer, 2000
3. Kuo, H.-H.: Gaussian Measures in Banach Spaces. Lecture Notes in Math., Vol. 463, Springer-Verlag, 1975
4. Kuo, H.-H.: White Noise Distribution Theory, CRC Press, 1996

Grading

The grade will be determined by homework assignments (65%) and the final exam (35%) with the tentative scale: A 85%; B 75%; C 65%

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