Course title: Financial Mathematics (724M1960).

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Text book: A course in Financial Calculus, Alison Etheridge, 2004, Cambridge University press.

Reference:1. Brownian Motion and Stochastic Calculus, I. Karatzas and S. Shreve, Springer-Verlag (Second edition,) 1991.

2. Introduction to Mathematical Finance, S. Pliska, 1997, Blackwell.

3. Arbitrage Theory in Continuous Time, T. Bjork, 1998, Oxford University Press (Second edition.)

4. Probability with Martingales, D. Williams, 1991, Cambridge University Press.

More advanced ones:

1. Martingale Methods in Financial Modeling, M Musiela and M. Rutkowski, 1997, Applications of Mathematics 36, Springer-Verlag, New York.
2. Stochastic Calculus for Finance, Vol. 1 & 2, S. Shreve, 2004, Springer, New York.

Content of the course:

Week 1 and 2, Single period models, risk-neutral probability, arbitrage characterization.

Week 3 and 4, Multi-period models, martingales, binomial martingale representation.

Week 5 and 6, Brownian motion, reflection principles and martingales in continuous time.

Week 7 and 8, Stochastic integration with respect to Brownian motions.

Week 9 and 10, Ito's formula, Girsanov's theorem and applications.

Week 11, Midterm.

Week 12, Feynman-Kac representation.

Week 13, Black-Scholes model.

Week 14 and 15, Exotic options, American options under Black-Scholes model.

Week 16 and 17, Multiple assets models and asset prices with jumps.

Week 18, Final.

Grade : Midterm 30%, Homework 30% and Final 40%.