ISyE/Math 6759: Stochastic Processes in Finance: I Syllabus

Course Topics:

Review of probability theory: random variables and stochastic processes; probability distributions and expectations. Institutional features of financial markets: bond, equity, derivatives and commodities. Probabilistic tools for modeling and analyzing financial markets: notions of complete and incomplete markets, arbitrage, equivalent martingale measures, the pricing of contingent claims by Arrow-Debreu state securities. Discrete-time asset pricing models: the capital-asset-pricing model and the binomial option pricing model; dynamic hedging and no-arbitrage pricing. Continuous-time asset pricing models: asset prices as Brownian motions, geometric Brownian motions, and martingales, Ito's formula and elementary stochastic calculus, Black-Merton-Scholes option pricing model, pricing under equivalent martingale measures and the term-structure of interest rates and its modeling.

Time and Classroom: M W 3:05 – 4:25 pm, IC 113.

Prerequisites: Math 3215 Probability & Statistics. Basic probability, linear algebra, and calculus; or consent of instructor.

Instructor: Dr. Shi-Jie Deng

Office: Groseclose Building (ISyE) Rm 319

Office Phone: (404) 894-6519 **Email:** deng@gatech.edu

Office Hour: 10:00-11:00 am Wednesdays or by appointment

TA Office Hours: 3-4pm Tues/Thurs, Rm 425B, ISYE Main (Zhi HAN, zhan9@gatech.edu).

Textbook: An Introduction to the Mathematics of Financial Derivatives, Salih N. Neftci, Academic Press; ISBN: 0125153929; 2nd edition (April 2000).

Class notes and supplementary materials: Class materials are posted at T-Square (https://t-square.gatech.edu/portal).

For basic probability knowledge: Notes used in a probability course at UC Berkeley (posted on T-Square), or, Introduction to Probability Models by Sheldon Ross, or any other books on elementary probability and stochastic processes.

For financial derivatives and quantitative modeling**:** *Options, Futures and Other Derivative Securities* by Hull, Prentice Hall; *Investment Science* by Luenberger, Oxford University Press, 1998.

Grading: Grade will be based on the grades of class-participation (10%), homework (15%), in-class mid-term (to be held on October 9, 2013) (35%) and in-class final exam (40%).

Final Exam: 2:50pm – 5:40pm, December 9, 2013.