IE 526 – Stochastic Calculus in Finance

Professor        Liming Feng
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Course site      http://compass2g.illinois.edu
Prerequisites    Introductory financial engineering; probability; programming in C/C++
Teaching assistants TBA; Office hours: TBA

Course description
A stochastic calculus approach to the pricing and risk management of derivative securities: no-arbitrage pricing; Brownian motion; stochastic calculus; the Black-Scholes-Merton model; risk neutral valuation; Feynman-Kac theorem; transform methods; change of numeraire; related topics

Course materials
- Lecture notes: available on http://compass2g.illinois.edu

Policies
- Projects 30%, Homework 30%, Final exam 40%
- Homework is due at the beginning of the class on the designated day. No late homework will be accepted. If you cannot submit on the due date, submit earlier to the professor. All homework assignments should be finished individually
- Cheating in this course is not tolerated. Those who violate will be reported. You should protect your own work all the time
- Request for correction of possible grading errors must be submitted to the professor within one week after the work is returned. No corrections possible afterwards
- Projects may be done in a team of 2-3 students. Programming in C/C++ is required
- Final exam is open notes; makeup exams are possible only under emergencies (official proof required prior to the exam)
- Announcements regarding the course are made in class and by email. It is your responsibility to attend class on time. Please make sure your email address is correct and your account is not over quota

Tentative course contents (29 lectures)
- Introduction to derivatives valuation
- Probability review (probability space, distributions, conditional expectation, stochastic process, filtration, martingale)
- Brownian motion
- Stochastic calculus
- Black-Scholes-Merton model (Black-Scholes-Merton equation, Black-Scholes formula, Girsanov theorem, martingale representation theorem, risk neutral pricing)
- Transform methods
- Partial differential equation approach (stochastic differential equation, Feynman-Kac theorem)
- Change of numeraire
- American options
- Implied volatility and smile, stochastic volatility and jump models
- Other related topics