Syllabus and Course Logistics for IEOR E4707 (Fall 2013)

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Teaching Assistant: To be confirmed

Course Website: All material will be posted on Columbia CourseWorks.

Class Time and Location: Tuesdays and Thursdays 10.10am to 11.25am in 303 Mudd. **Students should arrive on time and the use of cell-phones and laptops will not be permitted**. Students may be **cold-called** regularly to answer questions in class.

Prerequisites

1. IEOR E4701: Stochastic Models for Financial Engineering
2. IEOR E4706: Foundations of Financial Engineering

If a student intends to take the course without having taken the above pre-requisites then they should make sure that they have taken equivalent courses elsewhere. It is particularly important that they have taken an MS level course in applied probability that covered Brownian motion and martingales. It is also necessary that they have had some previous exposure to financial engineering and understand what forwards, future and options are.

Textbooks: Course notes will be provided. There are no required textbooks but excellent references include:

1. *A Course in Derivative Securities: Introduction to Theory and Computation* (Springer) by Kerry Back.
2. *Stochastic Calculus for Finance II: Continuous-Time Models* (Springer) by Steven E. Shreve.
3. *Introduction to the Economics and Mathematics of Financial Markets* (MIT Press) by Jakša Cvitanić and Fernando Zapatero.

Assignments
There will be approximately 10 assignments. Students are welcome to work together on the assignments but each student **must** write up his or her own solution. Any student that submits a copy (or partial copy) of another student's solution will receive zero for that assignment and may receive an F grade for the entire course. Late assignments will **not** be accepted!

The assignments are a vital component of the course and will be used to introduce new securities and concepts that were not covered in class. Most of the assignments will require some computing and students are free to use whatever software they prefer. Classroom demonstrations and assignment solutions, however, will generally use `Matlab` and `Excel-VBA`. Over the course of their studies, students are strongly encouraged to become proficient in these languages. (The Back textbook listed above contains a good introduction to `VBA`.)

Exams
A mid-term exam will be held in the middle of the semester and the final examination will be held in finals week. Both exams will be **closed book** although a formula / "cheat sheet" will be provided. Any student who is unable to take an exam must have a very good reason for doing so, e.g., a medical emergency. Such students will take a makeup exam that will be MORE difficult than the regular exam. They will also need to obtain approval from the dean's office to take such an exam. Exam regrades may be requested by:

1. Explaining in a written statement why you think you should obtain additional points.

2. Submitting this statement and the exam to either the TA or course instructor no later than one week after the exam was returned to the class. (This means that if you failed to collect your exam within a week of it being returned to the class, then you cannot request a regrade!)

It should be kept in mind that when a regrade is requested the entire exam will be regraded and it is possible that your overall score could go down as well as up. **We will also photocopy a subset of the exams before returning them to the class.** This is intended to deter the very, very few people (hopefully there are no such people in this class!) who might be tempted to rewrite parts of their exams before requesting a regrade.

Grading
An *approximate* overall grading scheme is: Assignments 20%, Midterm 35%, Final 45%.

Syllabus and Tentative Course Schedule

- Topic 1: Discrete-time theory and martingale pricing. (2.5 lectures)
- Topic 2: Introduction to stochastic calculus. (2.5 lectures)
- Topic 3: Black-Scholes, the Greeks and the volatility surface. (3 lectures)
- Topic 4: Foreign exchange (FX) options, ADRs and quanto securities. (2 lectures)
- Topic 5: Local volatility and stochastic volatility models. (2 lectures)
- Topic 6: Jump-diffusion models. (1 lecture)