ISyE 6759 – Stochastic Processes in Finance
Fall 2004 (Updated 8/24/04)

Instructor: Dave Goldsman; Room 433; e-mail sman@isye.gatech.edu; web site www.isye.gatech.edu/~sman; phone 404-894-2365/2301 (O/F).

Class Times and Place: T@ 3:05–4:25PM, IC 113. We will also conduct occasional review classes. It is very important that you attend all classes.

Office Hours: MW 8:10–9:10am. Please honor these office hours and come prepared. Of course, you can also make an appointment with me.

Teaching Assistant: Todd Lundquist; gte522n@mail.gatech.edu; Office Hours: TF 12:00–1:00PM, Skiles 154.

Catalog Description: Mathematical modeling of financial markets, derivative securities pricing, and portfolio optimization. Concepts from probability and mathematics are introduced as needed.

Prerequisites: You must know probability at the level of ISyE 2027.


Grading:
1/4 Homework + Project
1/4 Midterm (Tuesday, September 21)
1/4 Midterm (Tuesday, October 26)
1/4 Final (Monday, December 6, 11:30AM–2:20PM)
(Conflict time for the Final is Saturday, December 11, 9:00–11:50AM)

Homework: I will assign HW every week. You can work in groups of 2–3 students. HW must be neat, organized, stapled, and handed in on time. HW will be used to break ties in your overall grade—so make sure that you do it!
Make-Up Exams: I really hate giving make-up exams.

Regrading: If I've made a mistake in grading something, I'll be happy to fix things. In order for a test to be regraded, you must submit a Grade Grovelling form, available off of my website.

Course Outline (subject to change):

- Probability Review — Neftci, Chapter 5 (3 lectures)
- Conditional Probability and Conditional Expectation — Ross, Chapter 3 (2 lectures)
- Poisson Processes — Ross, Chapter 5 (1 lecture)
- Markov Chains — Ross, Chapter 4 (1 lecture)
- Brownian Motion and Stationary Processes — Ross, Chapter 10 (2 lectures)

- Intro to Financial Derivatives — Neftci, Chapter 1 (1 lecture)
- Arbitrage Theorem — Neftci, Chapter 2 (1 lecture)
- Calculus in Deterministic and Stochastic Settings — Neftci, Chapter 3 (1 lecture)
- Pricing Derivatives — Neftci, Chapter 4 (1 lecture)
- Simulation Methods (2 lectures)

- Martingales — Neftci, Chapter 6 (2 lectures)
- Differentiation in Stochastic Settings — Neftci, Chapter 7 (1 lecture)
- Brownian Motion in Financial Markets — Neftci, Chapter 8 (2 lectures)
- Integration in Stochastic Settings (Ito Integral) — Neftci, Chapter 9 (2 lectures)
- Ito’s Lemma — Neftci, Chapter 10 (1 lecture)

- Dynamics of Derivative Prices (Stochastic Diff Eqns) — Neftci, Ch 11 (2 lectures)
- Pricing Derivative Products (Partial Diff Eqns) — Neftci, Chapter 12 (2 lectures)
- The Black-Scholes PDE — Neftci, Chapter 13 (2 lectures)