CS 522 Computational Methods for Finance Spring 01

Course Description

Computational finance is a new discipline at the intersection of probability theory, finance and numerical analysis. The emphasis of this course is on numerical computing for some important financial problems such as derivative pricing and risk management. Standard as well as exotic derivatives on equities, indices, futures, and fixed income securities will be introduced; different computational methods are used for their pricing and hedging. In addition, we will examine the role of numerical computing in risk management and portfolio optimization.

The main topics include:

- asset price modeling and derivatives
- European option pricing
  - binomial method
  - Black-Scholes PDE
  - Black-Scholes formula
- forward, futures, and futures options,
- computational methods for solving a generalized BS PDE,
- volatility,
- American option pricing,
- risk management and portfolio optimization
- exotic options,
- interest rate modeling, bond, and bond options

Lecture : TR 11:40–12:55 pm, OH 216

Instructor: Yuying Li, Rhodes 635, 254-8843, yuying@cs.cornell.edu
Office Hour: Monday 2:30pm-3:30pm

Teaching Assistant: Siddharth Alexander, Rhodes 657, 255-7760, alexande@cam.cornell.edu
Office Hour: Thursday 2:30pm-3:30pm

Textbook: Wilmott, Howison and Dewynne, *The Mathematics of Financial Derivatives*

On Reserve at the Engineering/Management Library:

Wilmott, Howison and Dewynne, *Option Pricing*

Hull, *Options, Futures, and Other Derivatives*
Duffie, *Dynamic Asset Pricing Theory*
Wilmott, *Derivatives*

Prerequirements: programming experience (CS100) and numerical methods (CS222, CS421)

Programming: All the programming assignments will be done in **Matlab**.

Course Requirements:

There will be four or five assignments, a midterm, and a final exam.
Assignments count for 60%, the midterm 20%, and the final exam 20%.
The assignments are to be handed in before the lecture on the due date.