Course Description

Computational finance is an interdisciplinary subject of probability theory, finance, and numerical analysis. The emphasis of this course is on computational methods and mathematical models for various derivative pricing and risk management problems. Standard as well as exotic derivatives on equities, indices, and interest rate will be introduced; different computational methods are used for their pricing and hedging.

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: T. Tomita, Rhodes 657, 255-3399, tomita@cam.cornell.edu
Office Hour: Wed. 3:00-4:00pm


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*

Prerequisites: elementary probability and statistics, programming experience, e.g., CS100, and numerical methods e.g., CS222, CS421

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

Course Work:

There will be 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. Late assignments will be penalized, 25% off each day late.
The main topics are:

- discrete asset price modeling
- arbitrage pricing
- stochastic differential equation and Ito’s lemma
- European option
  - binomial method
  - Black-Scholes PDE and analytic formula
- forward, futures, and futures options
- finite difference methods for the BS PDE
- Monte Carlo method
- volatility modeling
- American option
- exotic options
- interest rate modeling, bond, and bond options
- risk management and portfolio optimization