Outline

Twelve lectures on a select set of topics in derivative pricing and risk hedging. The focus is on stochastic modeling, analysis, and numerical solution techniques.

Prerequisite:
Basic probability models and elementary stochastic processes (at the level of IEOR4606).

Text:
*Options, Futures, and other Derivatives*, J.C. Hull, Prentice Hall, Englewood Cliffs, NJ, newest edition. (Supplemented by materials from other references and class notes.)

References:


Homework:
11-12 sets, each with about 10 problems, assigned at every class, and due in two weeks, unless otherwise specified. Full credit if returned on time.

Midterm Exam:
Oct 25; a closed book exam, but an “aid sheet” is allowed.

Final Exam:
same format as the midterm.

Grading:
20% homework, 40% midterm, 40% final.

Contact:
Office Hours: Monday & Wednesday, 1-3p, or by appointment.
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Topics and Schedule (tentative):

- normal and lognormal distributions, stock price models, Brownian motion, geometric BM (lecture 1);
- stochastic calculus, Itô’s lemma; options pricing, risk-neutral valuation, Black-Scholes partial differential equations and solutions, sensitivity: the Greek letters (lectures 2,3);
- Black-Scholes model and variations, American options, put-call parity and inequalities (lectures 4,5);
- risk hedging, VaR (lecture 6);
- binomial trees, dividend models, finite difference methods, real options (lectures 7,8);
- martingales, change of measure (Girsanov theory), the Feynman-Kac connection to the Black-Scholes pdf (lecture 9, 10);
- equivalent martingale measures, numeraire, market price of risk (lectures 10, 11);
- introduction to term structure models, interest rate derivatives (lectures 11, 12).