

Course Syllabus

Math 181: THE MATHEMATICS OF FINANCE

Fall 2001

1 Background in Finance and Probability

1. Introduction and Course Description
2. Review of probability
3. Discrete Random Walks
4. Random walks with Gaussian increments
5. Equity models using random walks; the price of risk

2 Financial Derivatives

6. Financial derivatives (puts, calls)
7. No-arbitrage assumption; self-financing portfolios
8. Derivation of discrete Black-Scholes
9. Derivation of continuous Black-Scholes
10. Black-Scholes (cont.)
11. European put and call
12. American put and call
13. Hedging - the greeks
14. Hedging (cont.)

- 15. Examples and applications
- 16. MIDTERM November 3

3 Monte Carlo Methods

- 17. Introduction
- 18. Error analysis
- 19. Sampling methods
- 20. Variance reduction
- 21. Variance reduction (cont.)
- 22. Applications
- 23. Applications
- 24. Applications

4 Other Financial Securities

- 25. Exotic options (barriers)
- 26. Exotic options (path-dependent securities)
- 27. Interest rate models
- 28. Interest rate derivatives
- 29. Mortgage-backed securities