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.)
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