**MATH 133B – Suggested Syllabus**

|  |  |  |
| --- | --- | --- |
| **Week** | **Chapter** | **Topics** |
| 1 | 9 | **Parity and other option relationships:** put-call parity, generalized parity and exchange options, comparing options with respect to style, maturity and strike |
| 2 | 10 | **Binomial Option Pricing:** one-period binomial tree, constructing a binomial tree, two or more binomial periods, put options, American options, options on other assets |
| 3 | 11 | **Binomial Option Pricing:** understanding early exercise, understanding risk-neutral pricing, the binomial tree and lognormality |
| 4 | 12 | **The Black-Scholes Formula:** introduction to the Black-Scholes formula, applying the formula to other assets, option greeks, profit diagrams before maturity, implied volatility |
| 5 | 13 | **Market-Making and Delta-Hedging:** what do market-makers do, market-maker risks, delta-hedging, the mathematics of delta-hedging, the Black-Scholes analysis, market-making as insurance |
| 6 |  | **Midterm Exam (6:00pm – 7:00pm)** |
| 6 | 14 | **Exotic Options I:** introduction, Asian options, barrier options, compound options, gap options, exchange options |
| 7 | 18 | **The Lognormal Distribution:** the normal distribution, the lognormal distribution, a lognormal model of stock prices, lognormal probability calculations, estimating the parameters of a lognormal distribution |
| 8 | 19 | **Monte Carlo Valuation:** computing the option price as a discounted expected value, computing random numbers, simulating lognormal stock prices, Monte Carlo valuation, efficient Monte Carlo valuation |
| 9 | 23 | **Exotic Options II:** all-or-nothing options, all-or-nothing barrier options |
| 10 | 25 | **Interest Rate and Bond Derivatives:** introduction to interest rate derivatives, short-rate models and interest rate trees, market models |
| 11 |  | **Final Exam (7:00pm – 9:00pm)** |

**Textbook**: *Derivatives Markets by Robert L. McDonald, 3rd Edition*