# Course Syllabus Math 181: THE MATHEMATICS OF FINANCE

#### Winter 2003

# 1 Introduction and Background in Probability

- 1. Introduction and Course Description
- 2. Review of probability
- 3. Normal random variables and the central limit theorem

#### 2 Financial Markets

- 1. Equities
- 2. Derivatives

#### 3 Models for Equities

- 1. Discrete time models
- 2. Continuous time models
- 3. Arbitrage and completeness

#### 4 Models for Optimal Consumption

- 1. Utility functions
- 2. Utility maximization and linear programming

### 5 Models for Risk

- 1. Risk premium
- 2. Value-at-Risk (VAR)

### 6 Arbitrage and Risk-Neutral Pricing

- 1. Call-put parity
- 2. Pricing forwards
- 3. Risk-neutral pricing

# 7 Option Pricing

- 1. Discrete time models
- 2. Continuous time: Black Scholes equation
- 3. Risk-neutral pricing

#### 8 Numerical Methods

- 1. Tree methods
- 2. Monte Carlo methods
- 3. PDE methods