

**Business School, Brunel University  
MSc., EC5504 Financial Engineering**

**Prof. Menelaos Karanasos**

room SS269, tel.:01895265284 email: Menelaos.Karanasos@brunel.ac.uk
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## READING LIST & LECTURE SCHEDULE

### Aim (Broad Educational Purpose)

(i) To describe the theory and practice of financial engineering. Throughout this module we will show how to use financial theory to solve practical problems and also to illuminate the institutional material that students of financial engineering must absorb.

(ii) To enumerate and describe the various securities and markets in a clear and concise manner that accurately blends theory and practice.

### Objectives (Specific Learning Outcomes)

On successful completion, students should

- be familiar with the options on stocks, the definitions of the call option, the put option, and the long and short positions on options, the properties of the options, the factors affecting option prices and the concept of the put-call parity.
  - thoroughly understand the binomial option pricing model (BOPM) which is one of the two most widely used models for determining the equilibrium option price.
  - be able to create trading strategies involving options (the bull, the bear and the butterfly spreads; the straddles, the strips, the straps and the strangles)
  - be familiar with the Black-Scholes option pricing model
  - be able to measure the option's price sensitivity to changes in the factors that determine the value of an option: the 'Greeks'.
  - be familiar with the definitions of the spot interest rate, the yield-to-maturity and the forward rate and the basic relationships of the term structure of interest rates.
  - be familiar with the expectations hypothesis of the term structure, the liquidity-preference theory of the term structure, the concepts of the duration and the definitions of the reinvestment risk and the market risk.
- Extra
- thoroughly understand the forward and futures contracts.
  - thoroughly understand the mathematics of continuous time finance.
  - be familiar with the continuous and discrete time series models of the short term interest rates.

### **Teaching Arrangements**

Throughout the term 1, there will be a weekly lecture (Tuesday: 11-2 p.m.) combined with a one hour class per fortnight (Tuesday: 2-3 p.m.) which is compulsory and starts the 2nd week of the semester. During each lecture students will be given a set of lecture notes (and a problem set).

### **Course Assessment**

There will be a compulsory test (during the last week (week 11) of semester 1) which will count 15% towards the course unit mark. In June, students will sit a three hour formal examination which will count for 70% of the course unit mark.

In the following reading list: ★ denotes the most essential reading below.

### **Required Reading**

**H:** J. C. Hull, *Options, Futures and other Derivative Securities*, Seventh Edition, Prentice Hall, 2008.

### **Essential Reading**

**H1:** J. C. Hull, *Introduction to Futures and Options Markets*, Third Edition, Prentice Hall, 1998.

**JG:** R. S. Johnson and C. Giaccoto, *Options and Futures*, West, 1995.

**BM:** R. Brealey, S. Myers and F. Allen, *Principles of Corporate Finance*, Ninth Edition, McGraw Hill, 2008.

**CR:** J. C. Cox and M. Rubinstein, *Option Markets*, First Edition, Prentice Hall, 1985.

**T:** R.G. Tomkins, *Option Analysis*, Macmillan, 1994.

**A:** F.D. Arditti, *Derivatives*, Harvard Business School Press, 1996.

### **Module Outline**

#### **1. Option Concepts.**

[H★: Chapters 1 and 7. BM★: Chapter 20. JG: Chapters 1 and 4. CR: Chapters 2 and 4. Lecture Notes.]

#### **2. Trading Strategies involving Options.**

[H★: Chapter 8. JG: Chapter 3. BM: Chapter 20. CR: Chapter 1. Lecture Notes.]

#### **3. Binomial Option Pricing Model.**

[JG★: Chapter 5. BM: Chapter 20. CR: Chapter 5. Lecture Notes.]

#### **4. Black-Scholes Option Pricing Model.**

[H★: Chapter 10. CR: Chapters 5 and 6. Lecture Notes.]

5. The 'Greeks'.  
[H\*: Chapter 13. Lecture Notes.]
6. Expectation hypothesis/Duration of Bonds.  
[Lecture Notes\*. BM\*: Chapter 24.]
7. The Term Structure of Interest Rates.  
[Lecture Notes\*. BM\*: Chapter 24.]  
Extra
8. Forward and Future contracts.  
[H\*: Chapters 1 and 3. Lecture Notes.]
9. The Mathematics of Continuous Time Finance.  
[H\*: Chapters 9 and 10. Lecture notes\*]
10. Time Series Models for the Short Term Interest Rates.  
[Lecture Notes\*]