

School of Economics and Finance

## **FINA403 DERIVATIVE SECURITIES**

Trimester 1, 2013

### **COURSE OUTLINE**

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#### **Names and Contact Details**

Graeme Guthrie (course coordinator)

Room RH 326

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#### **Trimester Dates**

Teaching Period: Monday 4 March – Friday 7 June

Study Period: Monday 10 June – Thursday 13 June

Examination Period: Friday 14 June – Wednesday 3 July (inclusive)

#### **Withdrawal from Course**

1. Your fees will be refunded if you withdraw from this course on or before Friday 15 March 2013.
2. The standard last date for withdrawal from this course is Friday 17 May. After this date, students forced to withdraw by circumstances beyond their control must apply for permission on an '*Application for Associate Dean's Permission to Withdraw Late*' including supporting documentation. The application form is available from either of the Faculty's Student Customer Service Desks.

#### **Class Times and Room Numbers**

Lectures will be held on Thursday in room RWW125 from 2:40-4:30pm.

#### **Course Delivery**

Course delivery takes the form of 12 approximately two-hour long lectures.

#### **Expected Workload**

The workload for FINA 403 is intended to be similar to that for other 400-level ECON and FINA courses. The total expected workload is 150 hours.

#### **Course Learning Objectives**

By the end of this course, students should be able to:

- Demonstrate understanding of stochastic calculus, estimate Ito processes' underlying parameters, and use Ito's lemma
- Derive the partial differential equations that determine derivative prices

- Use risk-neutral pricing to value derivative securities
- Use finite difference and Monte Carlo techniques to price derivative securities
- Hedge and replicate derivative securities using portfolios of stocks and bonds

### **Course Content**

*Topic 1: Introduction* Derivative securities. Arbitrage.

*Topic 2: Stochastic Calculus* Wiener processes. Ito processes. Examples. Ito's Lemma.

Estimation of Ito processes.

*Topic 3: Risk-Neutral Pricing* Hedging portfolio. Fundamental pricing equation. Risk-neutral pricing. Black-Scholes formula. Delta hedging. Discrete rebalancing. Gamma hedging.

*Topic 4: Dividends* Hedging portfolio. Fundamental pricing equation. Risk-neutral pricing.

Options on stock indices. Currency derivatives. Options on futures.

*Topic 5: Monte Carlo Simulation* Black-Scholes revisited. Central Limit Theorem. Measuring efficiency. Antithetic variates method. Control variate method. Using the Euler approximation. Path-dependent securities.

*Topic 6: Finite Difference Methods* Finite differences. Explicit method. Implicit method. Crank-Nicholson method.

*Topic 7: Early Exercise Opportunities* Exercise strategies. Bermudan options. Dynamic programming. American options. Compound options.

*Topic 8: Modelling Volatility* Implied volatility. Empirical evidence. Stochastic volatility.

Hedging. Fundamental pricing equation. Risk-neutral pricing. Monte Carlo simulation.

### **Readings**

There is no set textbook for this course as comprehensive lecture notes will be available from <http://blackboard.vuw.ac.nz/>.

### **Materials and Equipment**

Non-programmable calculators will be allowed in the final examination.

### **Assessment**

The final grade will be determined by three assignments (contributing 40% in total) and a two-hour final exam (covering the whole course and contributing 60%).

The assignment due dates are

- Assignment 1 (8%): 2:40pm on Thursday, April 4 (start of lecture 4).
- Assignment 2 (16%): 2:40pm on Thursday, May 9 (start of lecture 8).
- Assignment 3 (16%): 2:40pm on Thursday, June 6 (start of lecture 12).

### **Penalties**

Assignments handed in late will not be marked. If a satisfactory medical certificate is provided, the weight from the assignment will be shifted onto the other pieces of assessment; otherwise, the assignment score will be recorded as 0.

Material exceeding word limits will not be marked.

### **Use of Turnitin**

Student work provided for assessment in this course may be checked for academic integrity by the electronic search engine <http://www.turnitin.com>. Turnitin is an on-line plagiarism prevention tool which compares submitted work with a very large database of existing material. At the discretion of the Head of School, handwritten work may be copy-typed by the School and submitted to Turnitin. A copy of submitted materials will be retained on behalf of the University

for detection of future plagiarism, but access to the full text of submissions will not be made available to any other party.

### **Examinations**

Students who enrol in courses with examinations are obliged to attend an examination at the University at any time during the formal examination period. The final examination for this course will be scheduled at some time during the period 14 June – 3 July.

### **Mandatory Course Requirements**

A necessary condition for passing the course is that the score on the final exam is at least 50%.

### **Class Representative**

A class representative will be elected in the first class, and that person's name and contact details made available to VUWSA, the course coordinator and the class. The class representative provides a communication channel to liaise with the course coordinator on behalf of students.

### **Communication of Additional Information**

Course documents and other information will be available on the course website at <http://blackboard.vuw.ac.nz>. Announcements will also be posted there.

### **Link to general information**

For general information about course-related matters, go to <http://www.victoria.ac.nz/vbs/studenthelp/general-course-information>

### **Note to Students**

Your assessed work may also be used for quality assurance purposes, such as to assess the level of achievement of learning objectives as required for accreditation and academic audit. The findings may be used to inform changes aimed at improving the quality of VBS programmes. All material used for such processes will be treated as confidential, and the outcome will not affect your grade for the course.

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