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School of Economics and Finance

## MOFI 401 OPTIONS

Trimester One 2006

### COURSE OUTLINE

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#### Contact Details

Course coordinator: Graeme Guthrie  
Office: RH 326  
Office hours: Monday 1:00-2:30 p.m.  
Email: graeme.guthrie@vuw.ac.nz

#### Class Times and Room Numbers

Lectures are held each Wednesday 2:40 – 4:30 p.m. in GB117, Old Government Building, Pipitea Campus during the first trimester of 2006.

The final examination will be held during the mid-year exam period.

#### Course Objectives

This course develops the tools required to hedge and price derivative securities, including the adjustments needed to handle the distinctive characteristics of different underlying assets, as well as the specifics of different instruments. Throughout the course, derivative pricing theory is integrated with the numerical methods required to apply the theory to real-world problems. At end of the course, when faced with such a problem, the student should be able to select the appropriate numerical technique and implement the appropriate derivative pricing model.

#### Course Content

- Topic 1: Introduction* Derivative securities. Arbitrage.
- Topic 2: Stochastic Calculus* (2 lectures) Wiener processes. Ito processes. Examples. Ito's Lemma. Estimation of Ito processes.
- Topic 3: Risk-Neutral Pricing* (3 lectures) Hedging portfolio. Fundamental pricing equation. Risk-neutral pricing. Black-Scholes formula. Delta hedging. Discrete rebalancing. Gamma hedging.
- Topic 4: Dividends* (1 lecture) Hedging portfolio. Fundamental pricing equation. Risk-neutral pricing. Options on stock indices. Currency derivatives. Options on futures.
- Topic 5: Monte Carlo Simulation* (1 lecture) 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* (2 lectures) Finite differences. Explicit method. Implicit method. Crank-Nicholson method.

*Topic 7: Early Exercise Opportunities* (1 lecture) Exercise strategies. Bermudan options. Dynamic programming. American options. Compound options.

*Topic 8: Modelling Volatility* (1 lecture) Implied volatility. Empirical evidence. Stochastic volatility. Hedging. Fundamental pricing equation. Risk-neutral pricing. Monte Carlo simulation.

*Topic 9: Interest Rate Models* (1 lecture) Single factor models. Risk-neutral pricing. Merton's model. Affine yield curve models. Term structure derivatives. Yield-curve matching models. Incorporating central bank behaviour.

### **Readings**

There is no set textbook for this course as comprehensive lecture notes will be available from <http://blackboard.vuw.ac.nz/>. However, the following book covers similar material at approximately the same level as this course.

John Hull, *Options, Futures, and Other Derivative Securities*, Prentice Hall, Englewood Cliffs, NY (1989).

### **Materials and Equipment**

Calculators will not be allowed in the final examination.

### **Assessment Requirements**

The final grade in this course will be calculated using the results of three assignments and a final examination.

- Assignment 1: Due at the start of Lecture 3, Wednesday, 15 March. Weight = 8%.
- Assignment 2: Due at the start of Lecture 7, Wednesday, 26 April. Weight = 16%.
- Assignment 3: Due at the start of Lecture 12, Wednesday, 31 May. Weight = 16%.
- Final exam: Two hours, date to be advised. Weight = 60%.

However, see the “Mandatory Course Requirements” below.

### **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.

### **Mandatory Course Requirements**

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

### **Communication of Additional Information**

Information on the course, including assignments and lecture notes, will be distributed via <http://blackboard.vuw.ac.nz/>.

### **General University Policies and Statutes**

Students should familiarise themselves with the University's policies and statutes, particularly those regarding assessment and course of study requirements, and formal academic grievance procedures.

### **Student Conduct and Staff Conduct**

The Statute on Student Conduct together with the Policy on Staff Conduct ensure that members of the University community are able to work, learn, study and participate in the academic and social aspects of the University's life in an atmosphere of safety and respect.

The Statute on Student Conduct contains information on what conduct is prohibited and what steps can be taken if there is a complaint. For queries about complaint procedures under the Statute on Student Conduct, contact the Facilitator and Disputes Advisor. This Statute is available in the Faculty Student Administration Office or on the website at: [www.vuw.ac.nz/policy/StudentConduct](http://www.vuw.ac.nz/policy/StudentConduct).

The policy on Staff Conduct can be found on the VUW website at: [www.vuw.ac.nz/policy/StaffConduct](http://www.vuw.ac.nz/policy/StaffConduct).

### **Academic Grievances**

If you have any academic problems with your course you should talk to the lecturer concerned or, if you are not satisfied with the result of that meeting, see the Head of School or the Associate Dean (Students) of your Faculty. Class representatives are available to assist you with this process. If, after trying the above channels, you are still unsatisfied, formal grievance procedures can be invoked. These are set out in the Academic Grievances Policy which is published on the VUW website:

[www.vuw.ac.nz/policy/AcademicGrievances](http://www.vuw.ac.nz/policy/AcademicGrievances).

### **Academic Integrity and Plagiarism**

Academic integrity is about honesty – put simply it means **no cheating**. All members of the University community are responsible for upholding academic integrity, which means staff and students are expected to behave honestly, fairly and with respect for others at all times.

Plagiarism is a form of cheating which undermines academic integrity. Plagiarism is **prohibited** at Victoria.

The University defines plagiarism as follows:

Plagiarism is presenting someone else's work as if it were your own, whether you mean to or not.

*'Someone else's work' means anything that is not your own idea, even if it is presented in your own style. It includes material from books, journals or any other printed source, the work of other students or staff, information from the Internet, software programmes and other electronic material, designs and ideas. It also includes the organization or structuring of any such material.*

### ***Plagiarism is not worth the risk.***

Any enrolled student found guilty of plagiarism will be subject to disciplinary procedures under the Statute on Student Conduct ([www.vuw.ac.nz/policy/studentconduct](http://www.vuw.ac.nz/policy/studentconduct)) and may be penalized severely. Consequences of being found guilty of plagiarism can include:

- an oral or written warning
- suspension from class or university
- cancellation of your mark for an assessment or a fail grade for the course.

*Find out more about plagiarism and how to avoid it, on the University's website at: [www.vuw.ac.nz/home/studying/plagiarism.html](http://www.vuw.ac.nz/home/studying/plagiarism.html).*

### **Students with Disabilities**

The University has a policy of reasonable accommodation of the needs of students with disabilities. The policy aims to give students with disabilities an equal opportunity with all other students to demonstrate their abilities. If you have a disability, impairment or chronic medical condition (temporary, permanent or recurring) that may impact on your ability to participate, learn and/or achieve in lectures and tutorials or in meeting the course requirements, then please contact the Course Coordinator as early in the course as possible. Alternatively you may wish to approach a Student Adviser from Disability Support Services to confidentially discuss your individual needs and the options and support that are available. Disability Support Services are located on Level 1, Robert Stout Building, or phoning 463-6070, email: [disability@vuw.ac.nz](mailto:disability@vuw.ac.nz). The name of your School's Disability Liaison Person can be obtained from the Administrative Assistant or the School Prospectus.

### **Student Support**

Staff at Victoria want students' learning experiences at the University to be positive. If your academic progress is causing you concern, please contact the relevant Course Co-ordinator, or Associate Dean who will either help you directly or put you in contact with someone who can.

The Student Services Group is also available to provide a variety of support and services. Find out more at [www.vuw.ac.nz/st\\_services/](http://www.vuw.ac.nz/st_services/) or email [student-services@vuw.ac.nz](mailto:student-services@vuw.ac.nz).

VUWSA employs two Education Coordinators who deal with academic problems and provide support, advice and advocacy services, as well as organising class representatives and faculty delegates. The Education Office is located on the ground floor, Student Union Building, phone 463 6983 or 463 6984, email [education@vuwsa.org.nz](mailto:education@vuwsa.org.nz).