

School of Economics and Finance

**MMAF 531**

**SPECIAL TOPIC:  
MATHEMATICS OF FINANCE**

Trimester 2, 2009

**COURSE OUTLINE**

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**Coordinator/Lecturer** Leigh Roberts, RH 323, phone 463 5937  
email: leigh.roberts@vuw.ac.nz

**Administrator** Anna Potts, RH 307, phone 463 6148  
email: anna.potts@vuw.ac.nz

**Lecture times** Friday 9.30 - 11.20, RWW 127

**Tutorial times** TBA

**Dates**

Trimester 2 starts on Monday 13 July 2009, and the exam period finishes on Saturday 14 November 2009.

**Withdrawal from the course**

Information on withdrawal from the course can be found in  
<http://www.victoria.ac.nz/home/admisenrol/payments/withdrawalsrefunds.aspx>

## Course Learning Objectives

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

- exhibit a sound comprehension of the theory of compound interest and its applications to insurance in particular, and to the financial world in general.
- apply financial mathematical tools to the pricing and evaluation of fixed interest and insurance contracts, and the simpler financial derivatives.
- exhibit a sound comprehension of the concepts underlying the yield curve and credit spreads.
- to place financial mathematics principles within the framework of financial risk management.

The course learning objectives apply to all sections of the course and are subject to testing in each item of assessment.

## Course Content

The course is modelled in part on the actuarial paper CT1 of the Institute of Actuaries, with conventional actuarial notation and terminology generally used. An exemption from the equivalent professional paper is however not available. Principal elements of the syllabus include:

1. Compound interest theory and the simpler annuity functions.
2. Valuation of loans, including Makeham's formula and the rule of 78, and the impact of income and capital gains tax.
3. Real yield allowing for inflation and indexation. Time weighted rate of return, linked internal rate of return.
4. Duration, matching, immunisation, convexity of a stream of payments; duration for a non-flat yield curve; and the relationship between duration and volatility.
5. The life table and the force of mortality; the hazard rate and survival curve.
6. Term structure of interest rates.  
Consistency of spot and forward interest rates.  
Overview of deterministic and stochastic interest rate models.  
A simple model of credit risk.
7. The lognormal distribution and its role in finance.

## Expected Workload

It is expected that the course will require approximately 200 hours of work, including class time.

## Readings

Notes and readings will be made available, generally on Blackboard although sometimes in class.

It is *not* recommended that you purchase any text books for this course. Books which may be useful for parts of the course, however, include:

- J. C. Hull (2007), *Risk Management and Financial Institutions*. Pearson Prentice Hall.
- J. J. McCutcheon and W. J. Scott (1986), *An introduction to the mathematics of finance*. Butterworth/Heinemann.

You can find Blackboard at <http://www.blackboard.vuw.ac.nz/>

A scientific calculator is required.

## Assessment

- 50% Three hour final examination, during the period 27 October - 14 November 2009.
- 30% One test of duration 100 minutes.
- 20% Weighted average assignment mark.

It is intended to hold the test approximately 3/4 of the way through the course, probably in week 9 or 10 (towards the end of September). Subject to sufficient speed in progressing through the course material the test will be held in class time, on a date to be fixed in consultation with the class.

Provided the student has good reason (for instance a medical certificate), and obtains permission *before* the due date from the course coordinator, there will be no penalty for handing in an assignment late. In other cases the assignment will first be graded on a basis comparable with those assignments handed in on time, and then have 5% of that grade subtracted for each day or part-day for which the assignment is late.

An assignment is expected to be written *entirely* by the student. In cases where there is any doubt in the marker's mind as to whether the assignment is entirely the student's own work, the coordinator reserves the right to withhold the mark until the situation has been clarified.

Due dates for assignments are normally two weeks after being set.

*Note: 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 audit purposes. The findings may be used to inform changes aimed at improving the quality of FCA programmes. All material used for such purposes will be treated as confidential, and the outcome will not affect your grade for the course.*

**Mandatory course requirements**

Taking the test is compulsory; and in order to pass the course, it is necessary to obtain at least 40% in the final examination.

**Communication**

Additional information or information on changes will be posted on Blackboard. Some information may be emailed to you via your SCS address, so check this regularly.

## SUPPLEMENTARY INFORMATION

### Faculty of Commerce and Administration Offices

#### Railway West Wing (RWW) - FCA Student and Academic Services Office

The Faculty's Student and Academic Services Office is located on the ground and first floors of the Railway West Wing. The ground floor counter is the first point of contact for general enquiries and FCA forms. Student Administration Advisers are available to discuss course status and give further advice about FCA qualifications. To check for opening hours call the Student and Academic Services Office on (04) 463 5376.

#### Easterfield (EA) - FCA/Education/Law Kelburn Office

The Kelburn Campus Office for the Faculties of Commerce and Administration, Education and Law is situated in the Easterfield Building on the ground floor (EA 005). This counter is the first point of contact for:

- Duty tutors for student contact and advice.
- Information concerning administrative and academic matters.
- Forms for FCA Student and Academic Services (e.g. application for academic transcripts, requests for degree audit, COP requests).
- Examinations-related information during the examination period.

To check for opening hours call the Student and Academic Services Office on (04) 463 5376.

### General University Policies and Statutes

Students should familiarise themselves with the University's policies and statutes, particularly the Assessment Statute, the Personal Courses of Study Statute, the Statute on Student Conduct and any statutes relating to the particular qualifications being studied; see the Victoria University Calendar or go to <http://www.vuw.ac.nz/policy>. For information on the following topics, go to the Faculty's website <http://www.vuw.ac.nz/fca>

- Academic Grievances
- Student and Staff Conduct
- Meeting the Needs of Students with Impairments
- Student Support

### 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. The University defines plagiarism as follows:

*The presentation of the work of another person or other persons as if it were one's own, whether intended or not. This includes published or unpublished work, material on the Internet and the work of other student or staff.*

It is still plagiarism even if you re-structure the material or present it in your own style or words.

*Note: It is however, perfectly acceptable to include the work of others as long as that is acknowledged by appropriate referencing.*

Plagiarism is prohibited at Victoria and is not worth the risk. Any enrolled student found guilty of plagiarism will be subject to disciplinary procedures under the Statute on Student Conduct and may be penalised severely. Consequences of being found guilty of plagiarism can include:

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

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

### **Manaaki Pihipihinga Programme**

Manaaki Pihipihinga is an academic mentoring programme for undergraduate Māori and Pacific students in the Faculties of Commerce and Administration, and Humanities and Social Sciences. Sessions are held at the Kelburn and Pipitea Campuses in the Mentoring Rooms, 14 Kelburn Parade (back courtyard), Room 109D, and Room 210, Level 2, Railway West Wing. There is also a Pacific Support Coordinator who assists Pacific students by linking them to the services and support they need while studying at Victoria. Another feature of the programme is a support network for Postgraduate students with links to Postgraduate workshops and activities around Campus.

For further information, or to register with the programme, email [manaaki-pihipihinga-programme@vuw.ac.nz](mailto:manaaki-pihipihinga-programme@vuw.ac.nz) or phone (04) 4636015. To contact the Pacific Support Coordinator, email [pacific-support-coord@vuw.ac.nz](mailto:pacific-support-coord@vuw.ac.nz) or phone (04) 463 5842.