

School of Economics and Finance

**MMAF 531**

**SPECIAL TOPIC: MATHEMATICS OF FINANCE**

Trimester 2, 2010

**COURSE OUTLINE**

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**Coordinator/Lecturer** Leigh Roberts, RH 323, phone 463 5937  
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**Administrator** Anna Potts, RH 307, phone 463 6148  
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**Lecture times** Friday 9.30 - 11.20, RWW 312

The coordinator is generally available in his office on Wednesday mornings for discussions on the course content, or dealing with problems arising from the course. He is generally unavailable on Mondays, Tuesdays and Thursdays.

In addition the coordinator will be overseas during the third week of the course (Monday 26 July to Friday 30 July inclusive). The double lecture from this week will be rescheduled, at a time fixed in consultation with the class.

**Trimester dates**

Teaching Period: Monday 12 July to Friday 15 October 2010

Study Period: Monday 18 October to Thursday 21 October 2010

Examination Period: Friday 22 October to Saturday 13 November 2010 (inclusive)

Note: Students who enrol in courses with examinations should be able to attend an examination at the University at any time during the formal examination period.

## Withdrawal from the course

Your fees will be refunded if you withdraw from this course on or before **23 July 2010**.

The last date for withdrawal from this course is the three-quarter point of the teaching period, viz. **Friday 24 September 2010**. After that date, permission to withdraw requires the consent of the associate Dean (Students) as set out in section 8 of the Personal Courses of Study Statute:

<http://policy.vuw.ac.nz/Amphora!~~policy.vuw.ac.nz~POLICY~000000001743.pdf>

To apply for permission, fill in the Late Withdrawal form available from either of our Student Customer Service Desks.

## Course Learning Objectives

By the end of this course, students should

- exhibit a sound comprehension of the theory of compound interest and its applications to insurance in particular, and to the financial world in general.
- be able to 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.
- be able 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. Subject to time constraints for the later topics listed, the syllabus will comprise:

1. Compound interest theory and the simpler annuity functions.
2. Valuation of loans, including Makeham's formula.
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.  
Valuation of futures and forward interest rate contracts.

7. Credit risk.
8. The lognormal distribution and its role in finance.

### **Course Delivery**

One two hour lecture per week for 12 weeks.

### **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.

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

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.

A calculator is required, with the capacity to evaluate powers, exponentials and logarithms. A basic calculator suitable for the course costs about \$20.

### **Assessment**

- 50% Three hour final examination, during the period  
22 October - 13 November 2010.
- 30% One test of duration 100 minutes.
- 20% Weighted average assignment mark.  
Assignments are expected to be due at the end of weeks 4, 6, 7, 9 and 11.

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. The timing of the later assignments may need to be altered in light of the timing of the test, but this will be done 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 of additional information**

Additional information will be conveyed to students via Blackboard and/or email.

Emails may be sent to the address that you supplied with your enrolment; but they may also be sent to your SCS email address, which is your official university email address. You should keep an eye on both email addresses.

### **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 subject to checking by Turnitin. Turnitin will retain a copy of submitted materials 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.

**For the following important information follow the links provided:**

#### **Academic Integrity and Plagiarism**

<http://www.victoria.ac.nz/home/study/plagiarism.aspx>

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

<http://www.victoria.ac.nz/home/about/policy>

**AVC (Academic) Website: information including: Conduct, Academic Grievances,  
Students with Impairments, Student Support**

[http://www.victoria.ac.nz/home/about\\_victoria/avcacademic/Publications.aspx](http://www.victoria.ac.nz/home/about_victoria/avcacademic/Publications.aspx)

**Faculty of Commerce and Administration Offices**

<http://www.victoria.ac.nz/fca/studenthelp/>

**Manaaki Pihipihinga Programme**

[http://www.victoria.ac.nz/st\\_services/mentoring/](http://www.victoria.ac.nz/st_services/mentoring/)