

## ACST305

### Quantitative Methods for Asset Liability Management

#### SECOND SEMESTER 2005

### UNIT OUTLINE

#### Teaching Staff Involved in the Unit

The staff involved in the teaching of this unit are

Staff Member	Weeks	Room	Email
Dr. Edwin Franks	1-7	C5C 378	efranks@efs.mq.edu.au
Professor Piet de Jong (Unit coordinator)	8-13	C5C 497	piet.dejong@mq.edu.au

Questions relating to the administration of the unit or unit content should be directed to the Unit Co-ordinator. Questions about the course content should be directed to the staff member teaching that part of the course.

#### Unit Details

Unit Name:	Quantitative Methods for Asset-Liability Management
Credit Points:	4
Prerequisites:	ACST200(P) or ECFS200 (P) or ACST201(P); STAT272(P); COMP124 or COMP125 or COMP115 or COMP155 or COMP 165;
Corequisites:	none

Please consult with the unit co-ordinator if you do not meet any of the prerequisite requirements for the unit.



Other units recommended for students interested in working in the financial services industry in areas related to the topics in this unit include COMP238 Numerical Computing, ECON232 Econometric principles, ECON233 Econometric Analysis, ECON333 Econometric Methods, STAT278 Computer Simulation, STAT279 Operations Research, and STAT305 Simulation and Forecasting.

**Unit Description**

This unit aims to introduce students to

- Stochastic models and numerical techniques that are used for the projection, valuation, and risk management of both asset and liability cash flows. Models considered will include fixed and interest sensitive cash flow models, term structure of interest rate models and simple equity return models.
- The measurement of financial risk
- Modern Portfolio Theory including the Markowitz Mean Variance Approach, The Capital Asset Pricing Model and Arbitrage Pricing Theory, and the Efficient Market Hypothesis
- The Valuation of Financial Derivative Securities such as Options, Forward Contracts, and Futures Contracts.
- The unit will introduce students to the basic concepts of stochastic calculus and their use in valuation and risk management in both discrete and continuous time models. It will also provide an introduction to analytical and numerical solution techniques, including simulation.

**Unit Objectives / Syllabus**

The course will cover most of the material in the UK Institute’s syllabus for Subject 109 Financial Economics. A copy is posted on the ACST305 website.

**Assumed Knowledge and Skills**

Students need to be able to use a computer to analyse financial problems. You should be able to use a word processing package (such as WORD), a spreadsheet (such as EXCEL), a statistical package (such as MINITAB) and a programming language (such as Visual Basic or Matlab). Students should use whatever computer programs they are most familiar with in doing assignments and other assigned tasks. The unit does not aim to teach students how to use computers, since this is covered in prerequisite units. You need to have a sound grasp of probability, calculus, matrix algebra and related mathematics, along with a sound understanding of the mathematics of compound interest.

**Lectures and Tutorials**

This unit will consist of 4 hours of combined lectures and workshops per week. There will be no formal tutorials - workshops covering examples and applications will be held during lectures.

Lectures are held at the following times:

Day	Time	Location
Tuesday	2.00 pm – 4:00 pm	E7BT5
Thursday	2:00 pm – 4:00 pm	E7BT2



## ACST305 Web site

This web site uses software called WebCT. To access this web site, go to <http://online.mq.edu.au> and log on. This leads you to a page which lists all Macquarie University WebCT sites to which you have access.

If you did not understand the above, you can obtain training on how to use a web browser by contacting the Information Technology Training Unit on Level 1 of the Library. If you can't access the site due to having forgotten your password, contact the Information Technology Customer Support Desk also on Level 1 of the Library.

Before logging in to this site, you should follow the link labelled "Technical Information" and read all the information there, including the Computer and Communications Security Policy and the Computer and Communications Usage Rules. This technical information mentions a number of "plugins" that may be required. Of those listed, in this unit you will only need Acrobat Reader.

You can access this web site from any computer with internet access including those in the library.

**The website will be used extensively for this unit so please consult the website regularly for course information.**

## Textbooks

Course notes will be posted on the website each week. The recommended textbooks for this course are :

Topics	Title	Author
Topics 6 & 8	A Random Walk Down Wall Street (2003 edition)	B. Malkiel
Topics 9 to 15	Options Futures and Other Derivatives (5 <sup>h</sup> edition)	John Hull

The textbook by Hull includes many worked examples and exercises. You may wish to buy a copy of the Solutions Manual – but a copy of the Solutions Manual will ALSO be placed in the Economic Reference Room.

Other useful references (which will be available in ERIC or the library) are:

*Modern Portfolio Theory and Investment Analysis* by Elton and Gruber

*Investment Science* by Luenberger

*Investments* by Sharpe and Alexander

*Financial Calculus* by Baxter & Rennie

*Financial Economics* by H. Panjer et al.

## Grading

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Macquarie University uses the grades HD, D, Cr, P, PC and F for grading the achievements of students in units of study. The grades of achievement are defined as follows:

**High Distinction (HD)** denotes performance which meets all unit objectives in such an exceptional way and with such marked excellence that it deserves the highest level of recognition.

**Distinction (D)** denotes performance which clearly deserves a very high level of recognition as an excellent achievement in the unit.

**Credit (C)** denotes performance which is substantially better than would normally be expected of competent students in the unit.

**Pass (P)** denotes performance which satisfies unit objectives.

**Conceded Pass (PC)** denotes performance which meets unit objectives only marginally.

**Fail (F)** denotes performance which does not meet unit objectives.

The numerical marks resulting from assessment of your work in this unit will be used as an initial indicator of the quality of your learning and understanding. The use of these numerical marks is, however, only a starting point in determining the appropriate grade. To obtain a grade you must satisfy the qualitative definition of that grade. Once your grade has been determined, you are allocated a standardised mark indicating your approximate position amongst students assigned that grade. In particular, note that the raw marks may be scaled in order to determine the Single Numerical Grade (SNG).

SNGs are not marks but are a ranking of students based on marks obtained from all facets of the unit assessment. The SNGs awarded in a particular unit are designed to indicate that the students in each performance band, from HD to CP, have satisfied the criteria for inclusion in that band and ranks them by their performance within that band. Since the ranges of SNGs differ from band to band the relationship between the raw marks and the SNGs may differ from band to band even within the same unit. The relationship between raw marks and SNGs would almost always differ between units.

### Assessment

The following table gives an indication of the relative weighting of the assessment components:

Mid Session Tests are 15% each	30%
Final Examination	70%

You need to achieve a pass both in the final exam and overall to pass the subject.

### Class Tests

There are two class tests. Test 1 is scheduled for Tuesday September 7 and Test 2 is scheduled for Tuesday 19 October. Both tests will be conducted during the lecture time. Please note that the class test dates, times and coverage may be subject to change, and that any alterations will be advised in lectures/on the unit webpage.

Normal examination rules apply to the conduct of class tests. These rules are set out under the heading "Conduct of Examinations" in the Student Information – Assessment section of the current Macquarie University Handbook of Undergraduate Studies. Students are responsible for familiarising themselves with these rules prior to the class test.





Tests will be returned to students at lectures or tutorials.

Students will be allowed to take a calculator and one A4 page into the tests.

### **Final Examination**

The final examination will be a three-hour written paper with ten minutes reading time.

Students will be allowed to take a calculator and one A4 page into the exam (filled in on however many sides)

### **Legibility of Handwriting**

You should ensure that your handwriting in the class assessment tasks and in the final examination is legible. Sections of work that are not legible will not be marked. For true/false questions, answers that are not clearly legible as either T or F will be assumed to be wrong and marked accordingly.

### **Special Consideration**

Applications for special consideration in respect of a class test or other class assessment task must be made on the "Advice of Absence or other Circumstances" form. These are available from and should be submitted to the Student Enquiry Service on Level 1 of the Lincoln Building.

Applications in respect of the final exam must be made on the "Request for Special Consideration" form. These forms are available from and should be submitted to the Academic Program Section on Level 4 of the Lincoln Building.

Applications based on medical grounds (whether for a class test or other class assessment task, or for the final examination) **must** be accompanied by the Professional Authority Form. Applications omitting this form (such as those which only supply a doctor's certificate) will be ignored.

Application forms are also online at <http://www.registrar.mq.edu.au/academic-index.htm>

### **Exemptions**

The unit ACST 305 corresponds to the professional subject 109. **You require a Credit grade or higher to receive the exemption.**

### **Mobile Phones**

Academic Senate has resolved that no mobile phones should be used in classrooms or be brought into examination rooms. Mobile phones must be switched off during class tests.

### **Calculators/Computers**

Calculators will be allowed in the class tests and the final examination but a clear indication of the steps involved in every calculation must be shown. Any machines that have a text-retrieval capacity, whether or not they have a full alphabet on the keyboard, are not allowed.

Calculators may be checked at the commencement of the class tests and final exam, and the make/model may be recorded.



## **Use of Computers for Coursework**

The computer laboratories available to you are the third year labs where you will have access to all the software relevant to this unit. Please take careful note of the policy of the Department of Actuarial Studies regarding the use of computers, which follows.

### **DEPARTMENT OF ACTUARIAL STUDIES**

#### **NOTICE TO STUDENTS RE USE OF COMPUTERS FOR COURSEWORK**

1. Computers do occasionally break down. This is a normal part of working life. When completing assignments, you should not leave computer work until the last moment, assuming the system will be available when you need it.
2. You are the person responsible for keeping backup copies of any data or files you create on a computer. If you fail to keep backup copies, loss of data or files, for whatever reason, is not an acceptable excuse for failing to complete an assignment on time.
3. You should have at least two backups. If you have only one backup disk, then a computer malfunction while you are updating your backups may simultaneously corrupt both the original version (on the hard disk or network) and your backup disk. Do not store your two backups together. Spread your risks.
4. If you are planning to write a document on one computer (eg. your home computer) and print it from a different computer, you should test well ahead of the due date that the second computer can print your document. This particularly applies if your documents incorporate graphs, tables, unusual fonts or special formatting.

## **Reference Material**

The Economics Resource and Information Centre (ERIC) is on the ground level of C5C. Copies of any additional readings, assignments, and other unit material will be placed in ERIC.

Material for at least some sections of work is available online, along with email and chat facilities, from: <http://online.mq.edu.au/student/>

## **The Institute of Actuaries of Australia**

Please refer to [http://www.actuary.mq.edu.au/current\\_students/join\\_institute.shtml](http://www.actuary.mq.edu.au/current_students/join_institute.shtml) for information on the advantages of joining the Institute of Actuaries of Australia as a student.

## **Cheating and Plagiarism**

To cheat in the context of university assignments, tests and examinations is to attempt to gain an unfair advantage by violating the principles of intellectual and scholarly integrity. Cheating also encompasses plagiarism, which is the appropriation or imitation of another person's ideas and manner of expressing them.

You are responsible for familiarising yourself with the document entitled "What is plagiarism?" at <http://www.student.mq.edu.au/plagiarism.html>.

