



## Division of Economic and Financial Studies

### Department of Actuarial Studies

## ACST101 : TECHNIQUES AND ELEMENTS OF FINANCE

### UNIT OUTLINE : Semester 1, 2008

Students in this unit should read this unit outline carefully at the start of semester. It contains important information about the unit including minimum requirements for some components. If anything in it is unclear, please consult the Unit Co-ordinator.

### TEACHING STAFF

The staff member involved in the teaching of this unit is

	Room	Telephone	Email
David Westcott Unit Co-ordinator	E4A615	9850 8568	david.westcott@mq.edu.au

Questions relating to the administration of the unit should be directed to the Unit Co-ordinator. Questions relating to the unit content should be directed to your tutor at your tutorial. **Consultation hours for the Unit Co-ordinator and the tutors will be shown on the ACST101 website.** Instructions for accessing the website are on page 4.

### UNIT PREREQUISITES

There are no prerequisites or corequisites, however a background of HSC mathematics or equivalent numerical competency is desirable.

### UNIT DESCRIPTION AND OBJECTIVES

Students will gain skills in the pricing of financial instruments in the Techniques section and knowledge of financial institutions, instruments and markets in the Elements section. ACST101 is a prerequisite for further study in the areas of actuarial studies and finance.

#### Techniques

The basic methods of financial mathematics (present value and accumulated value) are applied in valuing a range of financial transactions including the purchase of promissory notes, bank bills, bonds and debentures, the analysis of mortgage loans, personal loans and investment proposals.

#### Elements

The basic functions of the Australian financial system, the financial institutions (banks, insurance companies, finance companies, credit unions, etc.), the financial instruments (bills, bonds, debentures, shares, etc.) and the financial markets are discussed.

## LEARNING STRATEGY

**It is essential that you work steadily and consistently over the whole semester;** in particular attend tutorials and keep up with the weekly assignments. You should revise the previous week's techniques lecture before you attend your weekly tutorial. It is extremely difficult to catch up if you fall behind. Each topic builds on the previous one.

**Understanding of the concepts is required rather than memorisation of formulae.** Success in this unit requires logical thinking, reasoning and problem solving skills.

The Academic Senate of the University has set the average workload as three hours total work per credit point per week. (ie 9 hours per week for ACST101). Total work includes time for private study and reading as well as attending classes and performing set tasks.

## ASSESSMENT

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

Weekly Assignments (11)	10%
Class Tests (3)	20%
Final Examination	70%

- Assignments, Final Examination and Tutorial Attendance have minimum requirements.

## WEEKLY ASSIGNMENTS

- **A satisfactory attempt by the due date is required for at least 8 assignments.**

There are 11 weekly assignments, each mainly based upon a "techniques" topic. For each assignment you will use the website to obtain the questions and to enter your answers.

Before you can access Assignment 1 due in Week 3 you must score 100% in the Unit Requirements Quiz **and** at least 80% in **both** the Maths Revision Exercises and the Practice Assignment. These preliminary quizzes are all due early in Week 2.

The marks for all 11 assignments are used to calculate the component of the final assessment based on the assignments. **Assignments 10 and 11 will be given triple weighting.**

Full details of the computerised assignments are given in a separate handout.

## CLASS TESTS

Test One (Week 5)	Thursday 27 March Thursday 27 March	10 am 7 pm	Macquarie Theatre X5BT1
Test Two (Week 8)	Thursday 1 May Thursday 1 May	10 am 7 pm	Macquarie Theatre X5BT1
Test Three (Week 12)	Thursday 29 May Thursday 29 May	10 am 7 pm	Macquarie Theatre X5BT1

Full details of the three Class Tests will be given on the website under Announcements. The topics to be examined in each test are shown on page 6. Students must attend at the lecture time for which they are enrolled. Tests will be returned to students at the tutorial in the week following the test.

## FINAL EXAMINATION

- **To pass this unit a satisfactory performance is required in the final examination.**

The final examination will contain questions from all techniques and all elements lectures. It will be a three-hour written paper with ten minutes reading time.

The University examination period is between Wed. 11 June and Fri. 27 June 2008.

Part A: Forty-five multiple choice questions - twenty-two based on "techniques" and twenty-three based on "elements". Marked out of 45.

Part B: Three questions requiring application of "techniques" to the solution of practical problems. Marked out of 30.

The list of basic formulae shown at the end of this Unit Outline will be supplied.

The multiple choice questions are answered by marking (in pencil) a computer readable answer sheet. Bring **TWO 2B Pencils**, and an eraser, into the examination with you.

## GRADING

Macquarie University uses the grades HD, D, Cr, P, PC and F. Each symbol is explained in the Bachelor Degree Rules on page 98 of the 2008 Undergraduate Studies Handbook.

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. Note that the mark ranges mentioned in the Grades section on page 44 of the Handbook are not the raw marks. 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.

## TEXTBOOKS

The textbooks are available as a package from the Macquarie University Co-op Bookshop.

Knox D M, Zima P and Brown R L, *Mathematics of Finance*, 2nd Edition, McGraw-Hill (1999)

Viney C, *Financial Institutions, Instruments and Markets*, 5th Edition, McGraw-Hill (2007) (Custom edition of selected chapters)

## CALCULATORS

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.

**Calculators that have a text-retrieval capacity are not allowed.**

**Calculators that have a full alphabet on the keyboard are not allowed.**

You will need a calculator which has  $x^y$  or  $\wedge$ ,  $1/x$  and log or ln functions, and a memory.

## NUMERACY CENTRE C5A225

Students who lack the knowledge of mathematics needed for ACST101 are encouraged to seek the help of the Centre. Consultations are free of charge. Staff will recommend work to fill gaps in background knowledge of mathematics.

## LECTURES

The **Techniques** lecture is held at the following time:

Day	Time	Location
Wednesday	10 am	Macquarie Theatre
Thursday	7 pm	X5BT1

The **Elements** lecture is held at the following time:

Day	Time	Location
Thursday	10 am	Macquarie Theatre
Thursday	8 pm	X5BT1

You should attend your allocated techniques lecture and elements lecture each week.

Detailed lecture notes for both techniques and elements lectures are available from the ACST101 website.

## TUTORIALS

- **Tutorial attendance is compulsory.** Students must attend and fully participate in at least **9** tutorials, otherwise they may be excluded from the unit.

**Tutorials will commence in the second week of the semester.**

**To prepare for each weekly tutorial,** attempt at least the first few questions from the **Revision Exercises** for the previous week's Techniques lecture eg for the Week 2 tutorial you should attempt the Revision Exercises on Week 1. Revision Exercises are accessed from the website page for the corresponding techniques lecture.

**Tutorial exercises** will be provided at each tutorial so that you can practise applying the results developed in lectures. Your tutor is available to help you sort out the things that are not immediately obvious or prove to be a bit tricky.

**Tutorial Room** locations are shown on your enrolment printout. The tutorial list will also be shown under the Lecture Announcements icon of the ACST101 website on the Monday of the second week of classes. **You must attend your allocated tutorial.**

**Tutorial enrolment or change of tutorial** can be made through eStudent on the web in the **first two weeks** of the semester. **No tutorial changes are allowed after Week 2.**

## ACST101 WEBSITE

You may access the ACST101 website from your home or work computer if you are connected to the internet. You can also access it from the student laboratories located in C5C, E7B146 or E4B. See under Technical Information at the login address given below for details of recommended browsers.

The Student IT Service Desk (C5C244 ) provides information technology support and assistance to students of Macquarie University.

The login address is <http://learn.mq.edu.au> (There is no www in the address.)  
Then click on the login button.

You will be required to enter a username and password.

Your username will be your 8-digit Macquarie Student ID Number.

Your password will be your myMQ Student Portal password. This will be the original MQID password that was sent to you on enrolment (2 random characters followed by your date of birth in ddmmyy format), unless you have already changed your password in the myMQ Student Portal. You can look up your original MQID password at <http://www.library.mq.edu.au/help/ithelp/mqid.html> . Passwords are case sensitive.

The login address gives you access to all of your online units. Just click on the name of the unit you want to work on. When you want to change from one unit to another click on My Online Units at the top right of the screen.

If you do not attend a lecture , you should consult the Lecture Announcements section of the website to see what information, if any, you have missed.

When moving around the website the path that you have followed is displayed below the ACST101 Techniques and Elements of Finance line. To move back to a previous page, click on the title of that page. In particular to move back to the opening page, click on Home Page. An example is: Home Page > Tutorial Solutions > Tutorial Exercises on Week 1. To close your connection click on Log out at the top right of the screen.

If you wish to contact the unit co-ordinator, you can use the ACST101 website. Click on Mail on the left hand menu, then on Compose Message and send to David Westcott.

The following are available on the website:

1. Lecture notes and Revision Exercises for "Techniques".
2. Lecture summary and internet exercises for "Elements".
3. Tutorial Exercise solutions.
4. Assignments.
5. Class Test solutions for the past two semesters and the current semester.
6. Final Examination specimen exam papers and solutions.

## **SPECIAL CONSIDERATION**

If the quality of your work in this unit is adversely affected by illness, accident or other form of unavoidable disruption, you should acquaint yourself with the Unavoidable Disruption section on page 41 of the 2008 Undergraduate Studies Handbook and the Special Consideration section on page 44 of the Handbook.

**All requests for special consideration should be made in writing to the Registrar's Office and include full supporting documentation.**

- Notification of absence from a Class Test should be made within 1 week of the test on an Advice of Absence Form. The Lodgement Steps include notifying the Unit Coordinator as well as submitting the form through ERIC (E4B106).
- Requests for special consideration for the final examination should be made within 5 working days after the date of the examination or the day after the end of the examination period whichever is sooner. The Professional Authority Form which is required if you wish to request special consideration for the final examination due to illness can be found at <http://www.reg.mq.edu.au/Forms/APSCons.pdf>

Special consideration will NOT be granted where a student has unsatisfactory class test marks, unsatisfactory assignment marks or unsatisfactory tutorial attendance. The exam content and/or assessment standards of supplementary examinations will be made more stringent to allow for the extra time available for prior study.

Further details about Special Consideration and Supplementary Examinations will be posted on the ACST101 website in the last week of the semester under Announcements.

## UNIT TIMETABLE

Week Number	Week Beginning	Techniques Wed 10am / Thu 7pm	Elements Thu 10am / Thu 8pm	Class Test
1	25 February	Simple interest & simple discount	Information about Assignments	-
2	3 March	Compound interest	Overview	-
3	10 March	Compound interest	Banks and RBA	-
4	17 March	Annuities	Banks and RBA	-
5	24 March	Annuities	-	1
6	31 March	Annuities	Non-bank institutions	-
7	7 April	Mortgage loans	Non-bank institutions	-
STUDY	14 April	STUDY	STUDY	
BREAK	21 April	BREAK	BREAK	
8	28 April	Flat rate loans, NPV, IRR	-	2
9	5 May	Bonds & debentures	Government finances and instruments	-
10	12 May	Tax on bonds	Corporate finances and instruments	-
11	19 May	Varying annuities	Financial markets	-
12	26 May	Sinking funds and capitalised costs	-	3
13	2 June	Revision	-	-

Any alterations will be advised in lectures and via the ACST101 website.

- Class Tests will be based on the following lecture topics:

	Techniques	Elements
Test 1	Weeks 1,2,3	Weeks 2,3,4
Test 2	Weeks 4,5,6	Weeks 4,6,7
Test 3	Weeks 7,8,9,10	Weeks 9,10,11

- At each Class Test,
  - the formula sheet will be displayed on the overhead projector
  - normal examination rules will apply - see page 43 of the 2008 Undergraduate Studies Handbook. Students are responsible for familiarising themselves with these rules prior to the class tests.
- In weeks where there is a Class Test
  - the evening version of the test will be at Thursday 7pm.
  - the Thursday evening Techniques lecture will be held at 8pm instead of the normal time of 7pm
  - there will be no Elements lecture.

## TECHNIQUES TOPICS AND TEXTBOOK REFERENCES

### Textbook

Knox D M, Zima P and Brown R L, *Mathematics of Finance*, 2nd edition, McGraw-Hill (1999). The answers to the even-numbered exercises start on page 297, the answers to the odd-numbered exercises can be found on the website under the Tutorial Solutions icon.

Week	Techniques Topic	Textbook Reference
1	Simple Interest and Simple Discount	Chapter 1 (exclude 1.4 and 1.5)
2	Compound Interest	Chapter 2, 2.1 to 2.3 (exclude 2.4)
3	Compound Interest, Logarithms and Linear Interpolation	Chapter 2, 2.5 to 2.8 Appendices A & C
4	Valuation of Annuities	Chapter 3, 3.1 to 3.3 Chapter 4, Section 4.2
5	Valuation of Annuities	Chapter 3, 3.4 to 3.7 Chapter 4, 4.3 and 4.5
6	Valuation of Annuities	Chapter 4, Section 4.4 Chapter 5 (exclude 5.4)
7	Mortgage Loans	Chapter 6, 6.1 to 6.4
8	Flat Rate Loans Net Present Value and Internal Rate of Return	Chapter 6, Section 6.6 (exclude Rule of 78) Chapter 8, 8.1 and 8.2
9	Bonds and Debentures	Chapter 7, 7.1 to 7.4
10	Tax on Bonds	Chapter 7, 7.5 and 7.7 (exclude section 7.6 and pages 207 - 211)
11	Varying Annuities (The approach taken will be different to that of the textbook)	Chapter 4, Section 4.6
12	Sinking Funds and Capitalised Costs	Sections 6.5, 7.8 and 8.3

### Notes

- 1 Other sections of the textbook not referred to above are outside the scope of this unit and are NOT examinable.
- 2 The "Part A" exercises in the textbook are ideal for practice in applying the "techniques" to solve financial problems, but some of the "Part B" exercises which involve mathematical proofs are beyond the scope of this unit.

## ELEMENTS TOPICS AND TEXTBOOK REFERENCES

### Textbook

Viney C, *Financial Institutions, Instruments and Markets*, 5th Edition, McGraw-Hill (2007)

### References

Crane R, Fraser I and Martin T, *Financial Institutions, Markets and Instruments*, 5th edition, LBC Information Services (2001)

Valentine T, Ford G and Copp R, *Financial Markets and Institutions in Australia*, Prentice Hall (2003)

Hunt B and Terry C, *Financial Institutions and Markets*, 4th edition, Thomson (2005)

In addition the *Reserve Bank of Australia Bulletin* contains articles of current interest and statistical information. The "elements" tutorial exercises will contain a link to the RBA website which contains much of this information.

### Topics and Recommended Reading from Textbook

#### Topic 1 Overview of the Financial System

Week 2 Chapter 1

#### Topic 2 Banks and RBA

Week 3 Chapter 2 (2.1 to 2.4)

Week 4 Chapter 2 (2.5 to 2.8)

#### Topic 3 Non-Bank Institutions

Week 6 Chapter 3 (3.2 to 3.4)

Week 7 Chapter 3 (3.1, 3.5 to 3.8) (exclude 3.9)

#### Topic 4 Government Finances and Instruments

Week 9 Chapter 12

#### Topic 5 Corporate Finances and Instruments

Week 10 Chapter 5 (5.3, 5.5 only), 9 (9.3, 9.5, 9.6 only) and 10 (10.3, 10.5 only)

#### Topic 6 Financial Markets

Week 11 Chapter 18

## ERRATA TO KNOX, ZIMA & BROWN *Mathematics of Finance* second edition

Page 7	Example 2	Answer should be \$8.91 not \$6.51
Page 10	Example 4	The bill was purchased on 2 May not 3 May
Page 52	Solution Example 2	In the line beginning <i>Step 1</i> , 1000 should be 10000
Page 64	Example 2	The interest rate is $j_4 = 12\%$ not $j_4 = 3\%$
Page 227	Formula for $i$	Numerator should be $F_0 + F_1 + F_2 + F_3 + \dots + F_n$
Page 297	Exercise 1.6 Q4	Answer should be \$1025.28 not \$810.66
Page 299	Exercise 3.6 A Q2	Answer should be \$4291.72 not \$2262.56
Page 300	Exercise 6.5 A Q2	Answer should be sinking fund by \$302.25 not \$1090.80



**ACST101 : Techniques and Elements of Finance**

**FORMULAE FOR USE IN EXAMINATIONS**

- 1 Future value at simple interest

$$S = P(1 + rt)$$

- 2 Present value at simple interest

$$P = S(1 + rt)^{-1}$$

- 3 Present value at simple discount

$$P = S(1 - dt)$$

- 4 Future value at compound interest

$$S = P(1 + i)^n$$

- 5 Present value at compound interest

$$P = S(1 + i)^{-n}$$

- 6 Future value of  $n$  payments of  $R$  at compound rate  $i$

$$S = Rs \frac{i}{n} = R \left[ \frac{(1 + i)^n - 1}{i} \right]$$

- 7 Present value of  $n$  payments of  $R$  at compound rate  $i$

$$P = Ra \frac{i}{n} = R \left[ \frac{1 - (1 + i)^{-n}}{i} \right]$$

- 8 Approximation to bond or debenture yield for given price

$$i \approx \frac{I + \frac{1}{n}(C - P)}{\frac{1}{2}(C + P)}$$

- 9 Present value of an annuity with payments increasing in arithmetic progression

$$P = R[(1 + i)^{-1} + 2(1 + i)^{-2} + \dots + n(1 + i)^{-n}]$$

$$= R \left[ \frac{(1 + i)a \frac{i}{n} - n(1 + i)^{-n}}{i} \right]$$

- 10 Future value of an annuity with payments increasing in arithmetic progression

$$S = R \left[ \frac{(1 + i)s \frac{i}{n} - n}{i} \right]$$

- 11 Present value of an annuity with payments increasing in geometric progression

$$P = R[(1 + i)^{-1} + (1 + r)(1 + i)^{-2} + \dots + (1 + r)^{n-1}(1 + i)^{-n}]$$

$$= R(1 + r)^{-1} a \frac{j}{n} \text{ where } j = \frac{i - r}{1 + r}$$

- 12 Future value of an annuity with payments increasing in geometric progression

$$S = R(1 + r)^{n-1} s \frac{j}{n} \text{ where } j = \frac{i - r}{1 + r}$$