ACST3006

Quantitative Asset and Liability Modelling 1

Session 1, Special circumstances 2021

Department of Actuarial Studies and Business Analytics

Contents

Notice

As part of Phase 3 of our return to campus plan, most units will now run tutorials, seminars and other small group activities on campus, and most will keep an online version available to those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face activities for your unit, please go to timetable viewer. To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

General Information

Unit convenor and teaching staff
Unit Convenor
Jiwook Jang
jiwook.jang@mq.edu.au

Credit points
10

Prerequisites
(ACST202 or ACST2002) and (STAT272 or STAT2372)

Corequisites

Co-badged status

Unit description
This unit examines: rational expectations theory, rational choice theory, behavioural economics, properties of risk measures, risk and insurance companies, stochastic interest rate models, mean-variance portfolio theory, asset pricing models, single and multifactor returns models, binomial lattice models for option pricing and methods for calculating outstanding claims provisions in general insurance. Students gaining a credit average in both ACST3006 and ACST3007 (minimum mark of 60 on both units) will satisfy the requirements for exemption from the professional subject CM2 of the Actuaries Institute.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Apply decision making via utility functions, and describe rational expectations theory, rational choice theory, behavioural economics and three different forms of market efficiency.

ULO2: Employ the use of Capital Asset Pricing Model (CAPM), single/multi index models and Arbitrage Pricing Theory (APT) Model in asset pricing and analyse investment risk using various risk measures.

ULO3: Apply the binomial option pricing models to value European and American type

options.

ULO4: Apply a stochastic approach to the theory of interest on the mean and variance of the accumulation of a sequence of payments to solve practical problems.

ULO5: Use various methods of run-off triangles for valuation and reserving of liabilities.

General Assessment Information

Assessment criteria for all assessment tasks will be provided on the unit iLearn site.

It is the responsibility of students to view their marks for each within-session-assessment on iLearn within 20 days of posting. If there are any discrepancies, students must contact the unit convenor immediately. Failure to do so will mean that queries received after the release of final results regarding assessment tasks (not including the final exam mark) will not be addressed.

Late submissions and extensions

Tasks 10% or less – No extensions will be granted. Students who have not submitted the task prior to the deadline will be awarded a mark of 0 for the task, except for cases in which an application for special consideration is made and approved.

Tasks above 10% - No extensions will be granted. There will be a deduction of 10% of the total available marks made from the total awarded mark for each 24 hour period or part thereof that the submission is late (for example, 25 hours late in submission – 20% penalty). This penalty does not apply for cases in which an application for special consideration is made and approved. No submission will be accepted after solutions have been posted.

Assessment Tasks

Name	Weighting	Hurdle	Due
Assignment	20%	No	Thursday 1 April 12:00noon
Class Test	20%	No	Friday 21 May 11:00am
Final Exam	60%	No	Examination period

Assignment

Assessment Type [1]: Quantitative analysis task
Indicative Time on Task [2]: 20 hours
Due: **Thursday 1 April 12:00noon**
Weighting: **20%**

This is an individual assignment which focuses on problem solving using Excel spreadsheet.

On successful completion you will be able to:

- Apply decision making via utility functions, and describe rational expectations theory, rational choice theory, behavioural economics and three different forms of market efficiency.
- Employ the use of Capital Asset Pricing Model (CAPM), single/multi index models and Arbitrage Pricing Theory (APT) Model in asset pricing and analyse investment risk using various risk measures.

Class Test

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 10 hours
Due: **Friday 21 May 11:00am**
Weighting: **20%**

The test will be approximately 90 minutes, to be held during class time.

On successful completion you will be able to:

- Apply decision making via utility functions, and describe rational expectations theory, rational choice theory, behavioural economics and three different forms of market efficiency.
- Employ the use of Capital Asset Pricing Model (CAPM), single/multi index models and Arbitrage Pricing Theory (APT) Model in asset pricing and analyse investment risk using various risk measures.
- Apply the binomial option pricing models to value European and American type options.
- Apply a stochastic approach to the theory of interest on the mean and variance of the accumulation of a sequence of payments to solve practical problems.

Final Exam

Assessment Type [1]: Examination
Indicative Time on Task [2]: 28 hours
Due: **Examination period**
Weighting: **60%**

The final examination will be a three-hour written exam with ten minutes reading time, to be held during the University Examination period.

On successful completion you will be able to:

- Apply decision making via utility functions, and describe rational expectations theory, rational choice theory, behavioural economics and three different forms of market efficiency.
- Employ the use of Capital Asset Pricing Model (CAPM), single/multi index models and Arbitrage Pricing Theory (APT) Model in asset pricing and analyse investment risk using various risk measures.
- Apply the binomial option pricing models to value European and American type options.
- Apply a stochastic approach to the theory of interest on the mean and variance of the accumulation of a sequence of payments to solve practical problems.
- Use various methods of run-off triangles for valuation and reserving of liabilities.

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[1] If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the Writing Centre for academic skills support.

[2] Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

CLASSES

It is intended that learning in this session will be a combination of pre-recorded online lecture and on-campus tutorials. Tutorials will commence in week 2. The on-campus tutorial will be recorded and made available to students who are unable to attend.

REQUIRED and RECOMMENDED TEXTS and/or Materials

Required texts

Lecture materials are available for downloading from ACST3006 teaching website.

Recommended textbooks

• Investment Science; David Luenberger

• Choices, Values, and Frames; Amos Tversky and Daniel Kahneman

• Modern Portfolio Theory and Investment Analysis; Edwin J. Elton, Martin J. Gruber, Stephen J. Brown and William N. Goetzmann

• Investment Mathematics and Statistics; Andrew Adams, Della Bloomfield, Philip Booth and Peter England

• Options, Futures and Other Derivatives; John Hull

Optional ActEd material

• The ActEd CM2, that can be purchased directly from ActEd.

Unit Schedule

Week	Lecture Topics
1.	Utility Theory, Decision making via utility functions
2.	Stochastic dominance, Behavioural finance
3.	Mean-Variance portfolio theory
4.	The CAPM
5.	Single/Multi index models, Arbitrage pricing theory (APT)
6.	Measurements of investment risk (Assignment due - Thursday 1 April 12:00noon)
Semester Break	
7.	Options
8.	Single/Multi period Binomial option pricing model
9.	American option pricing via Binomial model
10.	Runoff triangle
11.	Class Test (Friday 21 May 11:00-1:00pm)
12.	Stochastic interest rate models / Efficient market hypothesis
13.	Revision

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://policies.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- Academic Appeals Policy
- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy
- Fitness to Practice Procedure
- Grade Appeal Policy
- Complaint Management Procedure for Students and Members of the Public
- Special Consideration Policy

Students seeking more policy resources can visit Student Policies (https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit Policy Central (https://policies.mq.edu.au) and use the search tool.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/admin/other-resources/student-conduct

Results

Results published on platform other than eStudent, (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- Getting help with your assignment
- Workshops
- StudyWise
- Academic Integrity Module

The Library provides online and face to face support to help you find and use relevant information resources.

- Subject and Research Guides
- Ask a Librarian

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/ offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.