



# ACST851

## Mathematics of Finance

S1 Day 2019

*Department of Actuarial Studies and Business Analytics*

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#### **Disclaimer**

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## General Information

Unit convenor and teaching staff

Unit Convenor, Lecturer

Han Li

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Contact via Email

E4A 724

Credit points

4

Prerequisites

ACST604 or (admission to MActPrac post 2014)

Corequisites

Co-badged status

Unit description

This unit provides a rigorous mathematical development of compound interest theory, using calculus where appropriate. Topics include the force of interest and its relationship to interest rates, inflation and capital gains tax, discrete and continuous term certain annuities, project appraisal, loans, bonds, yield curves, matching and immunisation, pricing by the 'no arbitrage' assumption, and forward rate agreements. Students are assumed to be able to use the basic functionality of a spreadsheet package of their choice.

## 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:

Be able to demonstrate a deep understanding of compound interest theory.

Be able to demonstrate a deep understanding of the use of annuities.

Be able to demonstrate application of the above concepts to a range of practical problems in finance, including loans, analysis of investment projects, valuation of fixed interest securities, including the use of yield curves and use of the “no arbitrage” pricing method, forward contracts and immunisation theory.

Be able to use spreadsheets to efficiently solve computationally challenging problems.

## General Assessment Information

Macquarie University uses the grades HD, D, Cr, P and F for grading the achievements of students in units of study. The meaning of each symbol is explained in Schedule 1 of the Assessment Policy, available at

[http://www.mq.edu.au/policy/docs/assessment/schedule\\_1.html](http://www.mq.edu.au/policy/docs/assessment/schedule_1.html)

When you work as an actuary or in any other profession, if you have a dangerous misunderstanding of a concept you may provide incorrect advice to a client, possibly with severe financial consequences for your client and yourself. However, if you realise that you don't understand a concept you may refrain from giving advice on it until you have filled the gaps in your knowledge. That is, dangerous misunderstandings have more serious consequences than a recognised lack of knowledge.

The grading philosophy and marking scales adopted in this unit (and in many other university units) reflect this situation. Correct relevant statements earn marks. Statements revealing dangerous misunderstandings result in the deduction of marks. If your answers reveal that your misunderstandings are very severe or numerous, you might earn a negative mark for a question. If a part of a question is worth  $x$  marks, the smallest mark you can be allocated for that part is  $-x$  marks.

As an example, a minor error when keying numbers into your calculator is not usually regarded as a dangerous error provided the resulting incorrect answer is plausible. However, if a calculator error results in an obviously unreasonable answer, such as a present value of a future cash flow which exceeds the size of that future cash flow, or a level monthly loan repayment that exceeds the amount of the loan, and you fail to state that you realise this answer is unreasonable, this would be regarded as a dangerous misunderstanding.

It is the responsibility of students to view their marks for each within session assessment on iLearn within 20 working 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 marks (not including the final exam mark) will not be addressed.

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

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Online Quizzes</a>	20%	No	Various - See iLearn calendar
<a href="#">Assignment</a>	20%	No	12pm 3 May 2019
<a href="#">Final Examination</a>	60%	No	Standard Exam Period

## Online Quizzes

Due: **Various - See iLearn calendar**

Weighting: **20%**

You should complete these quizzes online. They are on this unit's iLearn web site.

In answering the assessable quizzes, you may consult your notes or any textbooks you like, but you may not seek assistance from any humans in any way whatsoever. This includes seeking assistance in interpreting what the questions mean. You should not discuss any of the quiz questions with any of your class mates until after the deadline for submitting the quiz has passed, even if you have already submitted the quiz and so can no longer change your answers.

There are 7 quizzes covering topics 1 to 7.

Once you start a quiz, you have a maximum of 1 hour to complete it.

For topics 1 to 6, the quiz for a topic becomes available at 12:01 am on the Saturday after the tutorial on that topic and becomes unavailable at 11:59pm on the following Monday. That is, the quiz is available for 2 minutes less than 3 days. (We are avoiding using midnight as a cutoff time due to confusion as to whether "midnight Friday" means "midnight at the start of Friday" or "midnight at the end of Friday".) You may start the quiz at any time within that range, but if you start it within 1 hour of the end of that range then it still closes at the end of that range, meaning you get less than 1 hour to complete it.

For quiz 7, using the above approach would put the entire quiz availability period in the mid-session break. Hence the dates for that quiz have been moved 2 weeks later, which puts the last day of the availability period in week 8 of the session.

The simplest way to view the exact days on which each quiz opens and closes is to use the calendar tool within iLearn.

Your total quiz mark is the sum of your marks from each quiz. Since the quizzes have different numbers of questions, this means the quizzes are not equally weighted in the assessment.

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.

The quizzes provide early feedback, with the results of the first quiz becoming available early in week 3.

On successful completion you will be able to:

- Be able to demonstrate a deep understanding of compound interest theory.
- Be able to demonstrate a deep understanding of the use of annuities.
- Be able to demonstrate application of the above concepts to a range of practical problems in finance, including loans, analysis of investment projects, valuation of fixed interest securities, including the use of yield curves and use of the "no arbitrage" pricing

method, forward contracts and immunisation theory.

## Assignment

Due: **12pm 3 May 2019**

Weighting: **20%**

Submit the assignment using the tool on the unit's iLearn web site.

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.

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- Be able to demonstrate a deep understanding of compound interest theory.
- Be able to demonstrate application of the above concepts to a range of practical problems in finance, including loans, analysis of investment projects, valuation of fixed interest securities, including the use of yield curves and use of the “no arbitrage” pricing method, forward contracts and immunisation theory.
- Be able to use spreadsheets to efficiently solve computationally challenging problems.

## Final Examination

Due: **Standard Exam Period**

Weighting: **60%**

The length of the exam is 3 hours plus 10 minutes reading time.

Students are permitted to use non-programmable calculators with no text-retrieval capacity.

The exam is closed book. You may not bring any notes or textbooks into the exam. The exam paper includes a formulae sheet and a table giving the number of each day of the year.

Schedule 4 of the Assessment Policy includes the rules students must abide by during University examinations. The schedule is available at: [http://www.mq.edu.au/policy/docs/assessment/schedule\\_4.html](http://www.mq.edu.au/policy/docs/assessment/schedule_4.html)

In the exam, you are required to write your answers on the ruled (right hand) pages of the answer booklet provided. Anything written on the unruled (left hand) pages will not be marked.

On successful completion you will be able to:

- Be able to demonstrate a deep understanding of compound interest theory.
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- Be able to demonstrate application of the above concepts to a range of practical

problems in finance, including loans, analysis of investment projects, valuation of fixed interest securities, including the use of yield curves and use of the “no arbitrage” pricing method, forward contracts and immunisation theory.

## Delivery and Resources

### Classes

There are 5 hours of face-to-face teaching per week consisting of 3 hours of lectures and 2 hours of tutorial.

Class times can be found at: <http://www.timetables.mq.edu.au/>

### Required and Recommended Texts and/or Materials

No textbooks are prescribed for this unit. Detailed notes, exercises and solutions are available on the unit's web site. The web site also contains a list of all textbooks we are aware of covering significant amounts of the material in this unit.

### Technology Used and Required

You will require a calculator. For the final exam, you may only use non-programmable calculators which are not able to store text.

You may find it useful to be able to construct spreadsheets to verify your solutions to tutorial exercises. You will also be required to use a spreadsheet for the assignment. We do not prescribe any particular brand of spreadsheet.

We are required to point out that you need access to a computer and the internet to access this unit guide. (So if you don't have access to a computer and the internet, then you are probably not reading this sentence. Perhaps you are dreaming.) You also need access to a computer and the internet to access the course material on the unit's iLearn web site.

### Unit Web Site

The web site for this unit can be accessed at <http://ilearn.mq.edu.au>

### Teaching and Learning Activities

This unit is taught via lectures and tutorials. However, a significant amount of the lecture time will be spent on attempting problems. The emphasis is on learning by doing.

## Unit Schedule

Since students often seem to print the schedule, it is provided in a printer-friendly form in the administration section of this unit's iLearn web site.

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). 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](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Undergraduate students seeking more policy resources can visit the [Student Policy Gateway](https://students.mq.edu.au/support/study/student-policy-gateway) (<https://students.mq.edu.au/support/study/student-policy-gateway>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central>).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/study/getting-started/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](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

### Supplementary Exams

Information regarding supplementary exams, including dates, is available at:

[http://www.businessandconomics.mq.edu.au/current\\_students/undergraduate/how\\_do\\_i/special\\_consideration](http://www.businessandconomics.mq.edu.au/current_students/undergraduate/how_do_i/special_consideration)

## 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](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

## 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](http://ask.mq.edu.au)

If you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto: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/](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.

## Graduate Capabilities

### PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

### Learning outcomes

- Be able to demonstrate a deep understanding of compound interest theory.
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- Be able to demonstrate application of the above concepts to a range of practical problems in finance, including loans, analysis of investment projects, valuation of fixed interest securities, including the use of yield curves and use of the “no arbitrage” pricing method, forward contracts and immunisation theory.
- Be able to use spreadsheets to efficiently solve computationally challenging problems.

### Assessment tasks

- Online Quizzes
- Assignment



- Final Examination

## PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

### Learning outcomes

- Be able to demonstrate a deep understanding of compound interest theory.
- Be able to demonstrate a deep understanding of the use of annuities.
- Be able to demonstrate application of the above concepts to a range of practical problems in finance, including loans, analysis of investment projects, valuation of fixed interest securities, including the use of yield curves and use of the “no arbitrage” pricing method, forward contracts and immunisation theory.
- Be able to use spreadsheets to efficiently solve computationally challenging problems.

### Assessment tasks

- Online Quizzes
- Assignment
- Final Examination

## Changes from Previous Offering

There have been no significant changes to the unit's content since the previous offering.