



# ACST3059

## Actuarial Modelling

Session 2, Weekday attendance, North Ryde 2021

*Department of Actuarial Studies and Business Analytics*

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#### **Disclaimer**

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#### **Session 2 Learning and Teaching Update**

The decision has been made to conduct study online for the remainder of Session 2 for all units WITHOUT mandatory on-campus learning activities. Exams for Session 2 will also be online where possible to do so.

This is due to the extension of the lockdown orders and to provide certainty around arrangements for the remainder of Session 2. We hope to return to campus beyond Session 2 as soon as it is safe and appropriate to do so.

Some classes/teaching activities cannot be moved online and must be taught on campus. You should already know if you are in one of these classes/teaching activities and your unit convenor will provide you with more information via iLearn. If you want to confirm, see the list of [units with mandatory on-campus classes/teaching activities](#).

Visit the [MQ COVID-19 information page](#) for more detail.

## General Information

Unit convenor and teaching staff

Unit Convenor

Alan Xian

[alan.xian@mq.edu.au](mailto:alan.xian@mq.edu.au)

Credit points

10

Prerequisites

ACST358 or ACST3058

Corequisites

Co-badged status

Unit description

Survival models will be used to estimate decrement rates from actual experience, compare these with standard rates, and prepare new tables. In constructing new tables, consideration will be given to risk factors; selection; data collection; graduation; and testing the graduation. The concept of actuarial modelling will be discussed. Methods for mortality projection will be described and applied. Profit testing of conventional and unit-linked contracts will also be covered. Machine learning will be introduced. The 'actuarial control cycle', a conceptual framework of the processes for developing and managing financial enterprises and products, will be studied. Students gaining a weighted average of credit across all of ACST3058, ACST3060 and the CS2-related components of the assessment in ACST3059 (minimum mark of 60% on all three components) will satisfy the requirements for exemption from the professional subject CS2 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:** Examine and employ a variety of exposed to risk, graduation and mortality projection techniques.

**ULO2:** Develop an understanding of aspects of the theory and practice of statistical learning methods.

**ULO3:** Model and critically analyse scenarios involving financial risks for various types of financial institutions and compare ways of managing these risks.

**ULO4:** Discuss the concept of the Actuarial Control Cycle and apply it to solve a variety of practical business problems involving financial and actuarial risks.

**ULO5:** Identify and apply the relevant statistical techniques in solving practical actuarial problems within the actuarial control cycle framework.

## 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 of assessments

Sometimes unavoidable circumstances occur that might prevent you from submitting an assessment on time and, in that case, you may be eligible to lodge a [Special Consideration request](#).

Unless a [Special Consideration request](#) has been submitted and approved, please note that no extensions to assessment deadlines will be granted. Assessments that are submitted late will attract a late penalty:

1. There will be a deduction of 10% of the total available marks for each 24 hour period or part thereof that the submission is late.
2. No assessment will be accepted more than 72 hours after the original due date and time (incl. weekends).
3. No late submissions will be accepted for timed assessments (e.g., quizzes, online tests) or for tasks with a weighting of 10% or less.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Assignment</a>	30%	No	Week 9
<a href="#">Class Test</a>	30%	No	Week 10
<a href="#">Discussion Forum Posts</a>	5%	No	Weeks 9 - 13
<a href="#">Group Presentation</a>	5%	No	Weeks 11 - 13
<a href="#">Final Exam</a>	30%	No	University Examination Period

## Assignment

Assessment Type <sup>1</sup>: Project

Indicative Time on Task <sup>2</sup>: 25 hours

Due: **Week 9**

Weighting: **30%**

This is an individual assignment which focuses on actuarial modelling using R.

On successful completion you will be able to:

- Examine and employ a variety of exposed to risk, graduation and mortality projection techniques.
- Develop an understanding of aspects of the theory and practice of statistical learning methods.

## Class Test

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 15 hours

Due: **Week 10**

Weighting: **30%**

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

On successful completion you will be able to:

- Examine and employ a variety of exposed to risk, graduation and mortality projection techniques.
- Develop an understanding of aspects of the theory and practice of statistical learning methods.

## Discussion Forum Posts

Assessment Type <sup>1</sup>: Participatory task

Indicative Time on Task <sup>2</sup>: 5 hours

Due: **Weeks 9 - 13**

Weighting: **5%**

A range of participatory tasks through discussion forum participation.

On successful completion you will be able to:

- Model and critically analyse scenarios involving financial risks for various types of financial institutions and compare ways of managing these risks.
- Discuss the concept of the Actuarial Control Cycle and apply it to solve a variety of practical business problems involving financial and actuarial risks.
- Identify and apply the relevant statistical techniques in solving practical actuarial problems within the actuarial control cycle framework.

## Group Presentation

Assessment Type <sup>1</sup>: Presentation

Indicative Time on Task <sup>2</sup>: 5 hours

Due: **Weeks 11 - 13**

Weighting: **5%**

The presentation is an oral presentation to the class.

On successful completion you will be able to:

- Model and critically analyse scenarios involving financial risks for various types of financial institutions and compare ways of managing these risks.
- Discuss the concept of the Actuarial Control Cycle and apply it to solve a variety of practical business problems involving financial and actuarial risks.

## Final Exam

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 15 hours

Due: **University Examination Period**

Weighting: **30%**

The final examination will be a 90-minute written paper with ten minutes reading time, to be held during the University Examination period.

On successful completion you will be able to:

- Model and critically analyse scenarios involving financial risks for various types of financial institutions and compare ways of managing these risks.
  - Discuss the concept of the Actuarial Control Cycle and apply it to solve a variety of practical business problems involving financial and actuarial risks.
  - Identify and apply the relevant statistical techniques in solving practical actuarial problems within the actuarial control cycle framework.
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<sup>1</sup> 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.

<sup>2</sup> 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

### Information about Classes and Course Material

The timetable for classes can be found on the University web site at <http://www.timetables.mq.edu.au/2021>. This timetable shows the class times and locations.

### Lectures

Please refer to iLearn for details.

### Tutorials

Please refer to iLearn for details.

### Consultation hours

Consultations will be provided on a regular basis and details will be posted to iLearn. Consultations provide an excellent method for students to clarify any questions that they may have and it is highly suggested that students take advantage of this resource.

### Announcements

Any changes to the course will be announced in lectures and on iLearn. Make sure that you regularly check the Announcements on iLearn.

### Computer skills.

In this unit students are expected to be able to use R, which will feature extensively throughout the course material and assessments.

### Course Materials

Lecture materials and course notes will be provided via iLearn. You will not need any other

textbooks. The library does have some actuarial textbooks which may be useful as a source of additional practice problems (references will be posted on iLearn).

Each week tutorial problems and solutions will be posted on iLearn.

Copies of old class tests and exams, with worked solutions, will be made available on iLearn.

### **Technology**

Students will need to use computers to access iLearn. Students who do not own a computer can use the University's PC labs.

Some assessment tasks such as the discussion posts and assignment may require some research (e.g. using Google Scholar or the library's electronic databases).

The assignment will require the use of R, which is freely available online. Students are also recommended to download RStudio.

### **iLearn**

The course notes, readings, recordings, tutorial questions and tutorial solutions for this unit will be posted on iLearn. There will be a separate section for each week.

To find the iLearn page, go to [ilearn.mq.edu.au](http://ilearn.mq.edu.au) and enter your user name and password. Once you log in, you should see a list of all the units you are enrolled in - and this should include ACST3059 Actuarial Modelling. Click on the unit name to go to the unit's iLearn home page.

- If you have trouble logging in to iLearn or you can't remember your password, ring 9850 HELP or send a question by email to [OneHelp@mq.edu.au](mailto:OneHelp@mq.edu.au).
- If you have any personal questions, then you can send Alan a message via iLearn (click on "Send a message"). For example, if you are sick and you need Special Consideration, or you want to switch tutorials because you have a timetable clash, send a message to Alan via iLearn "Send a Message". Alternatively, you can also email Alan directly.
- If you have any general questions about the unit, you can post a message under **General Discussion** (which is on iLearn). This is a public noticeboard: all the students and staff can see your message. For example, if you have a question about one of the assignments, you can post the question here.
- Students are encouraged to help each other. If you notice that one of your colleagues has posted a question on General Discussion, and you think you know the answer, you may post a reply. You are encouraged to help each other with tutorial questions.
- Please be polite to each other when you post messages on iLearn.
- If you have any helpful suggestions for how to improve the course, please feel free to send Alan a message.
- Important information is often posted on the Announcements in iLearn - for example we might want to tell you about a scholarship, or an ASSOC event, or a room change for a

tutorial. So please read the Announcements, which are sent to your University email.

## Unit Schedule

### Weeks 1 - 5

**Mortality modelling** including exposed to risk, graduation, statistical tests for graduation and mortality projections.

### Weeks 6 - 8

**Introduction to machine learning** including fundamental machine learning concepts and an introduction to supervised and unsupervised learning techniques.

### Weeks 9 - 13

**Introduction to the Actuarial Control Cycle** including the Financial system, General insurance, Data Analytics, Life Insurance, Reinsurance, Private Health Insurance, Professionalism/Ethics, Superannuation, Banking, Mutual organisations and Governance and People.

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](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 \(https://students.mq.edu.au/support/study/policies\)](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 \(https://policies.mq.edu.au\)](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](mailto: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](http://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](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.