



# ACST3059

## Actuarial Modelling

Session 2, Special circumstance 2020

*Department of Actuarial Studies and Business Analytics*

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#### Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

#### Notice

As part of [Phase 3 of our return to campus plan](#), most units will now run tutorials, seminars and other small group learning activities on campus for the second half-year, while keeping an online version available for those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face and online 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 and teaching staff

Jackie Li

[jackie.li@mq.edu.au](mailto:jackie.li@mq.edu.au)

Contact via Email

Room 725, 4 Eastern Road

Thursdays 11am-12pm during teaching weeks

Teaching staff

Bruce Edwards

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Contact via Email

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Angela Chow

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Credit points

10

Prerequisites

ACST358 or ACST3058

Corequisites

Co-badged status

### Unit description

In this unit industry participants work together with students throughout the session. The unit integrates and synthesises the knowledge learnt over the actuarial degree and foreshadows the transition to a professional career. Students will use survival models to estimate decrement rates from actual experience, compare these with the rates in standard tables, and prepare new standard tables. As part of the construction of new tables, consideration will be given to risk factors and the effects of selection; design of data collection; statistical analysis and graduation of the observed rates; and testing of the graduation. The unit concludes with a review of actuarial concepts covered in the three-year undergraduate actuarial program and an introduction to the 'actuarial control cycle', a conceptual framework of the processes for developing and managing financial enterprises and products. Students develop graduate level critical analysis, problem solving and communication skills, and an awareness of the challenges facing businesses. Students gaining a Credit average in both ACST3058 and ACST3059 (minimum mark of 60) will satisfy the requirements for exemption from professional subject CT4 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:** Describe and communicate effectively the principles of actuarial modelling and apply them to common actuarial problems both individually and in a team environment.
- ULO2:** Model and critically analyse scenarios involving financial risks for various types of financial institutions and compare ways of managing these risks.
- ULO3:** Discuss the concept of the Actuarial Control Cycle and apply it to solve a variety of practical business problems involving financial and actuarial risks.
- ULO4:** Describe how to test crude estimates for consistency with a standard table or a set of graduated estimates and describe the process of graduation.
- ULO5:** Derive the maximum likelihood estimator for the parameter of Binomial and Poisson models and describe how to estimate transition intensities depending on age, exactly or using the census approximation.

## General Assessment Information

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 Tasks

Name	Weighting	Hurdle	Due
<a href="#">Group Assignment</a>	20%	No	Week 3 to Week 12
<a href="#">Class Test</a>	20%	No	Week 7
<a href="#">Final Exam</a>	60%	No	University Exam Period

### Group Assignment

Assessment Type <sup>1</sup>: Quantitative analysis task

Indicative Time on Task <sup>2</sup>: 20 hours

Due: **Week 3 to Week 12**

Weighting: **20%**

An assignment requiring data analysis and investigation along with a written report (word limit of up to 5000 words) and an oral presentation.

On successful completion you will be able to:

- Describe and communicate effectively the principles of actuarial modelling and apply them to common actuarial problems both individually and in a team environment.
- 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.

### Class Test

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

Indicative Time on Task <sup>2</sup>: 10 hours

Due: **Week 7**

Weighting: **20%**

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

On successful completion you will be able to:

- Describe how to test crude estimates for consistency with a standard table or a set of graduated estimates and describe the process of graduation.
- Derive the maximum likelihood estimator for the parameter of Binomial and Poisson

models and describe how to estimate transition intensities depending on age, exactly or using the census approximation.

## Final Exam

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

Indicative Time on Task <sup>2</sup>: 28 hours

Due: **University Exam Period**

Weighting: **60%**

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

On successful completion you will be able to:

- Describe and communicate effectively the principles of actuarial modelling and apply them to common actuarial problems both individually and in a team environment.
- 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.
- Describe how to test crude estimates for consistency with a standard table or a set of graduated estimates and describe the process of graduation.
- Derive the maximum likelihood estimator for the parameter of Binomial and Poisson models and describe how to estimate transition intensities depending on age, exactly or using the census approximation.

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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

The timetables for classes can be found on the University website at:

<https://timetables.mq.edu.au/2020/>

Tutorials will commence in Week 2 of the session.

Lecture handouts are available for download from the website in advance of lecture classes.

You will be required to use the teaching website, Word, PDF, R, and Excel.

Course materials are available on iLearn. To access the website, go to <http://ilearn.mq.edu.au> and log in using your usual login and password.

## Unit Schedule

Week Topic

- 1 Exposed to Risk
- 2 Exposed to Risk
- 3 Exposed to Risk
- 4 Exposed to Risk
- 5 Statistical Tests
- 6 Graduation
- 7 Class Test
- 8 Control Cycle
- 9 Control Cycle
- 10 Control Cycle
- 11 Control Cycle
- 12 Control Cycle
- 13 Revision

## 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.*)

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.businessandeconomics.mq.edu.au/current\\_students/undergraduate/how\\_do\\_i/disruption\\_to\\_studies](http://www.businessandeconomics.mq.edu.au/current_students/undergraduate/how_do_i/disruption_to_studies)

## 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](https://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.