



# ACST359

## Actuarial Modelling

S2 Day 2015

*Dept of Applied Finance and Actuarial Studies*

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## General Information

Unit convenor and teaching staff

Unit Convenor

Jackie Li

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

Contact via Email

Please refer to iLearn

Lecturer

Bruce Edwards

[bruce.edwards@mq.edu.au](mailto:bruce.edwards@mq.edu.au)

Contact via [bruce.edwards@mq.edu.au](mailto:bruce.edwards@mq.edu.au)

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Consultation: To be advised

Credit points

3

Prerequisites

ACST358

Corequisites

Co-badged status

Unit description

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 gaining a grade of credit or higher in both ACST358 and ACST359 are eligible for exemption from subject CT4 of the professional exams of the Institute of Actuaries of Australia.

## 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:

Describe the principles of actuarial modelling

Identify the most significant risks for various types of financial institution and compare ways of managing these risks

Discuss the concept of the Actuarial Control Cycle and apply it to a variety of straightforward practical commercial situations

Describe how to test crude estimates for consistency with a standard table or a set of graduated estimates and describe the process of graduation

Use the Binomial and Poisson models for mortality, derive the maximum likelihood estimator for the model parameter. Describe how to estimate transition intensities depending on age, exactly or using the census approximation

## General Assessment Information

The following apply to the class test and final examination:

- You are permitted ONE A4 page of paper containing reference material printed on both sides. The material may be handwritten or typed. The page will not be returned to you at the end of the final examination.
- Any mortality or statistical tables that you require will be provided to you.
- Calculators (no text-retrieval capacity) are permitted.
- Dictionaries are not permitted.
- For full marks, clear and complete working must be shown.

The following applies to the class test and assignment:

- No extensions will be granted. Students who do not attend the class test or submit the assignment by the due date will be awarded a mark of 0 for the task except in cases where the formal Disruption Policy applies.

To be eligible to pass this unit, a pass is required in the final examination.

## Assessment Tasks

Name	Weighting	Due
<u>Class Test</u>	10%	Week 8
<u>Assignment</u>	20%	Week 9

Name	Weighting	Due
<u>Final Exam</u>	70%	Exam period

## Class Test

Due: **Week 8**

Weighting: **10%**

Test covering Sections 1 to 5 inclusive. You will have 75 minutes to complete the test.

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
- Use the Binomial and Poisson models for mortality, derive the maximum likelihood estimator for the model parameter. Describe how to estimate transition intensities depending on age, exactly or using the census approximation

## Assignment

Due: **Week 9**

Weighting: **20%**

An assignment requiring data analysis and investigation along with a written report and presentation will be required. You will work in groups for the written component of the assignment. More detail on this task will be provided later in the session.

On successful completion you will be able to:

- Describe the principles of actuarial modelling
- Describe how to test crude estimates for consistency with a standard table or a set of graduated estimates and describe the process of graduation
- Use the Binomial and Poisson models for mortality, derive the maximum likelihood estimator for the model parameter. Describe how to estimate transition intensities depending on age, exactly or using the census approximation

## Final Exam

Due: **Exam period**

Weighting: **70%**

A three-hour written exam will be held during the normal university examination period. Questions will cover the entire unit.

To be eligible to pass this unit, a pass is required in the final examination.

On successful completion you will be able to:

- Identify the most significant risks for various types of financial institution and compare ways of managing these risks
- Discuss the concept of the Actuarial Control Cycle and apply it to a variety of straightforward practical commercial situations
- Describe how to test crude estimates for consistency with a standard table or a set of graduated estimates and describe the process of graduation
- Use the Binomial and Poisson models for mortality, derive the maximum likelihood estimator for the model parameter. Describe how to estimate transition intensities depending on age, exactly or using the census approximation

## Delivery and Resources

### Classes

The timetables for classes can be found on the University website at:  
<http://www.timetables.mq.edu.au>.

Tutorials will commence in Week 2 of the session.

### Required or recommended texts and/or materials

Lecture handouts are available for downloading from the website in advance of lecture classes. Print these and bring them to the relevant lecture. It is expected that you will have these notes in the relevant lectures.

### Technology used and required

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

### Unit webpage

Course material is available on the learning management system (iLearn). To access the teaching website, go to <http://ilearn.mq.edu.au> and login using your usual login and password.

## Unit Schedule

Please refer to iLearn.

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy [http://mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

Assessment Policy <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Grievance Management Policy [http://mq.edu.au/policy/docs/grievance\\_management/policy.html](http://mq.edu.au/policy/docs/grievance_management/policy.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html) *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of 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/support/student\\_conduct/](https://students.mq.edu.au/support/student_conduct/)

## Results

Results shown in *iLearn*, 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>.

## Supplementary Exam

Further information regarding supplementary exams, including dates, is available here

[http://www.businessandconomics.mq.edu.au/current\\_students/undergraduate/how\\_do\\_i/disruption\\_to\\_studies](http://www.businessandconomics.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>) 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>

## IT Help

For help with University computer systems and technology, visit <http://informatics.mq.edu.au/help/>.

When using the University's IT, you must adhere to the [Acceptable Use Policy](#). The policy applies to all who connect to the MQ network including students.

## Graduate Capabilities

### Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

#### Learning outcome

- Identify the most significant risks for various types of financial institution and compare ways of managing these risks

#### Assessment task

- Final Exam

### Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

#### Learning outcomes

- Describe the principles of actuarial modelling
- Identify the most significant risks for various types of financial institution and compare ways of managing these risks
- Discuss the concept of the Actuarial Control Cycle and apply it to a variety of straightforward practical commercial situations
- Describe how to test crude estimates for consistency with a standard table or a set of graduated estimates and describe the process of graduation

- Use the Binomial and Poisson models for mortality, derive the maximum likelihood estimator for the model parameter. Describe how to estimate transition intensities depending on age, exactly or using the census approximation

## Assessment tasks

- Class Test
- Assignment
- Final Exam

## Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

## Learning outcomes

- Describe the principles of actuarial modelling
- Identify the most significant risks for various types of financial institution and compare ways of managing these risks
- Discuss the concept of the Actuarial Control Cycle and apply it to a variety of straightforward practical commercial situations
- Describe how to test crude estimates for consistency with a standard table or a set of graduated estimates and describe the process of graduation
- Use the Binomial and Poisson models for mortality, derive the maximum likelihood estimator for the model parameter. Describe how to estimate transition intensities depending on age, exactly or using the census approximation

## Assessment tasks

- Class Test
- Assignment
- Final Exam

## Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication



technologies as appropriate.

This graduate capability is supported by:

## **Learning outcomes**

- Describe the principles of actuarial modelling
- Discuss the concept of the Actuarial Control Cycle and apply it to a variety of straightforward practical commercial situations

## **Assessment tasks**

- Assignment
- Final Exam

## **Changes from Previous Offering**

There have been changes to teaching personnel since the previous offering of this unit.

## **Research and practice**

This unit uses research from Macquarie researchers and data sourced from Australian life insurance experience.