



# ACST886

## Actuarial Modelling

S2 Day 2019

*Department of Actuarial Studies and Business Analytics*

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## General Information

Unit convenor and teaching staff

Unit convenor & lecturer

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04EaR 615

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Lecturer

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04EaR 227

See iLearn

Credit points

4

Prerequisites

STAT810 or STAT806

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. 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.

## 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:

Formulate profit-testing approaches to insurance problems.

Select, describe, critically examine and employ a variety of exposed to risk, graduation and mortality projection techniques while also developing programming skills to undertake these tasks.

Assemble statistical learning techniques to tackle data science problems.

Identify the most significant 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 a variety of straightforward practical commercial situations.

## General Assessment Information

### Gradebook

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

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

### 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.

These requirements mean that **no extensions will be granted** and as each task is worth less than 10% (7%, 3%, 7%, 3%, 7% and 3%), **missing a submission deadline will result in a mark of zero for the task**, except where an application for special consideration is made and approved.

### Special consideration

Where a special consideration application is approved, the student may be offered an alternative assessment or may receive a mark based on the percentage mark achieved by the student in one or more other assessment tasks, at the unit convenor's discretion.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Assignment</u>	30%	No	Weeks 04, 05, 06, 07, 08 & 09
<u>Class test</u>	10%	No	Week 08
<u>Final Examination</u>	60%	No	Exam period

### Assignment

Due: **Weeks 04, 05, 06, 07, 08 & 09**

Weighting: **30%**

There will be six tasks, each of which must be submitted electronically via iLearn and possibly other platform(s) (to be specified on iLearn). The six tasks consist of three pairs. Each pair is made up of a practical (coding) task and a peer marking task (using iLearn's peer assessment tool to mark the work of three of your classmates). Each coding task is worth 7%; each peer marking task is worth 3%.

Any written work required to be submitted as part of the practical (coding) task must be submitted as a PDF file. If you submit your written work in a file format other than PDF you will awarded a mark of zero for that part of the assessment requiring written answers.

Any computer code required to be submitted as part of the practical (coding) task must be submitted as a standard ASCII (text) file. If you submit your code in a file format other than standard ASCII (text) you will be awarded a mark of zero for the associated coding question.

The practical (coding) tasks are due in each of weeks 04, 06 and 08. The peer marking tasks are due ten days after their associated practical (coding) task.

On successful completion you will be able to:

- Formulate profit-testing approaches to insurance problems.
- Select, describe, critically examine and employ a variety of exposed to risk, graduation and mortality projection techniques while also developing programming skills to undertake these tasks.
- Assemble statistical learning techniques to tackle data science problems.

### Class test

Due: **Week 08**

Weighting: **10%**

A fifty minute test covering the material taught in weeks 01–07 will be held during class time in week 08.

On successful completion you will be able to:

- Formulate profit-testing approaches to insurance problems.
- Select, describe, critically examine and employ a variety of exposed to risk, graduation and mortality projection techniques while also developing programming skills to undertake these tasks.
- Assemble statistical learning techniques to tackle data science problems.

## Final Examination

Due: **Exam period**

Weighting: **60%**

A three hour final examination for this unit will be held during the University Examination period.

No reference material may be taken into the examination. However, students will be provided with reference sheets which cover relevant contents from *Formulæ and Tables for Actuarial Examinations* (2002) published by the Institute and Faculty of Actuaries.

On successful completion you will be able to:

- Select, describe, critically examine and employ a variety of exposed to risk, graduation and mortality projection techniques while also developing programming skills to undertake these tasks.
- Assemble statistical learning techniques to tackle data science problems.
- Identify the most significant 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 a variety of straightforward practical commercial situations.

## Delivery and Resources

### Textbook

There is no textbook for this unit. Unit materials are available on iLearn.

### Technology Used and Required

#### Assignments

You need to electronically submit your written solutions (using iLearn or other specified platform) to the assignments as PDF files. Some possibilities to produce these files are: scan your handwritten solutions to a PDF file; use WORD (or similar software) to type out your solutions and save your work as a PDF file. For each assignment you can only submit one PDF file; it must contain all the pages of your solution (so make sure, if your scanner produces separate PDF pages, that you can combine them into one file). Your PDF file must be able to read by the

current version of Adobe Acrobat Reader—check this is the case before submission (if it can't be read, then it can't be marked and you will be awarded a mark of zero for the assessment task).

Students will make extensive use of the R language for statistical computing and graphics.

You may also need to submit your computer (R) code for checking. This will be done using the GitHub platform.

## 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 \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).

## 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](https://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

- Formulate profit-testing approaches to insurance problems.
- Select, describe, critically examine and employ a variety of exposed to risk, graduation and mortality projection techniques while also developing programming skills to undertake these tasks.
- Assemble statistical learning techniques to tackle data science problems.
- Identify the most significant 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 a variety of straightforward practical commercial situations.

## Assessment tasks

- Assignment
- Class test
- Final Examination

## PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

## Learning outcomes

- Formulate profit-testing approaches to insurance problems.
- Select, describe, critically examine and employ a variety of exposed to risk, graduation and mortality projection techniques while also developing programming skills to undertake these tasks.
- Assemble statistical learning techniques to tackle data science problems.
- Identify the most significant 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 a variety of straightforward practical commercial situations.

## Assessment tasks

- Assignment
- Class test



- 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

- Formulate profit-testing approaches to insurance problems.
- Select, describe, critically examine and employ a variety of exposed to risk, graduation and mortality projection techniques while also developing programming skills to undertake these tasks.
- Assemble statistical learning techniques to tackle data science problems.
- Identify the most significant 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 a variety of straightforward practical commercial situations.

### Assessment tasks

- Assignment
- Class test
- Final Examination

## Research and Practice

This unit uses research by Macquarie University researchers and external sources (references will be given in the lectures, tutorials and assignment).