



ACST3059

PACE: Actuarial Modelling

Session 2, In person-scheduled-weekday, North Ryde 2026

Department of Actuarial Studies and Business Analytics

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General Information

Unit convenor and teaching staff Tandy Xu jianhui.xu@mq.edu.au
Credit points 10
Prerequisites 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. Visit Employability Connect for important information on this unit.

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 both individually and collaboratively in teams 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

Delivery: Weekly lectures and tutorials. Second half of session applied to an Australian aged-care ("Support at Home") case study through two assessments, plus three Taylor Fry industry workshops (Weeks 6, 8, 10). Assessment: Individual Report 25%, Group Presentation 25%, Final Exam 50%.

Technology: R / RStudio (assessed R code in the Individual Report; R Practice Workbook on iLearn). iLearn for all materials and submissions. Recording software (e.g. Zoom) for the Group Presentation. Data files provided on iLearn.

Materials & readings: All slides, notes, tutorials, case-study briefs, workshop guides and the R Practice Workbook on iLearn. Recommended text: James et al., An Introduction to Statistical Learning. [mortality-modelling reading — add if set]. Group Presentation sources: AIHW, GEN Aged Care Data, My Aged Care, Support at Home program manual, Royal Commission; anchor paper Zhang, Shi & Huang (2023).

Other requirements: Group formation, workshop participation, and on-time submission of both case studies (with a GenAI declaration) as set out in the assessment details.

Late Submission Penalties: If you submit your assessment late, 5% of the total possible marks will be deducted for each day (including weekends), up to 7 days. Submissions more than 7 days late will receive a mark of 0. Example 1 (out of 100): If you score 85/100 but submit 20 hours late, you will lose 5 marks and receive 80/100. Example 2 (out of 30): If you score 27/30 but submit 20 hours late, you will lose 1.5 marks and receive 25.5/30.

Assessment Tasks

Name	Weighting	Hurdle	Due	Groupwork/Individual	Short Extension	AI Approach
Formal examination	50%	No	Exam Period	Individual	No	Observed
Professional practice: Actuarial solution to a real-world problem	25%	No	01/11/2026	Individual and Group	No	Observed

Name	Weighting	Hurdle	Due	Groupwork/Individual	Short Extension	AI Approach
Professional practice: Report on mortality and analytics	25%	No	25/10/2026	Individual	Yes	Open

Formal examination

Assessment Type ¹: Examination

Indicative Time on Task ²: 30 hours

Due: **Exam Period**

Weighting: **50%**

Groupwork/Individual: Individual

Short extension ³: No

AI Approach: Observed

The purpose of this assessment is for you to formally demonstrate the expertise you have gained in this unit, including both the Actuarial Control Cycle content and the technical mortality and data analytics content.

You will participate in a three-hour exam with 10 minutes reading time held during the University Examination period. Important information about the exam will be made available on the unit iLearn page. You should also review the [MQ Exams website](#) for general tips. The exam is marked as a single integrated assessment.

Deliverable(s): Formal exam

Individual assessment

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.
- 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 both individually and collaboratively in teams 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.

Professional practice: Actuarial solution to a real-world problem

Assessment Type ¹: Presentation task

Indicative Time on Task ²: 15 hours

Due: **01/11/2026**

Weighting: **25%**

Groupwork/Individual: Individual and Group

Short extension ³: No

AI Approach: Observed

The purpose of this assessment is for you to work with your peers to develop and present an actuarial solution to a real-world problem.

You will collaborate in groups to research a relevant actuarial problem, develop a proposed solution, and present your findings to peers and industry representatives.

Skills in focus:

- Discipline knowledge
- Critical thinking and problem solving
- Communication skills
- Work readiness

Deliverable(s): Group presentation [max. 15 minutes overall, 5 mins per person; combination of group mark (60%) and individual mark (40%)]

Individual and group assessment

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.
- 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 both individually and collaboratively in teams to solve a variety of practical business problems involving financial and actuarial risks.

Professional practice: Report on mortality and analytics

Assessment Type ¹: Written Submission

Indicative Time on Task ²: 20 hours

Due: **25/10/2026**

Weighting: **25%**

Groupwork/Individual: Individual

Short extension ³: Yes

AI Approach: Open

The purpose of this assessment is for you to apply actuarial data analysis techniques using R statistical software to a real-world actuarial problem.

You will analyse mortality experience and model transitions using actuarial methodologies, and produce a report that communicates the results of your data analysis and interpretation.

Skills in focus:

- Discipline knowledge
- Digital skills
- Critical thinking and problem solving
- Communication skills

Deliverable(s): Written report showcasing results of data analysis [max 5000 words]

Individual assessment

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.
- 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 both individually and collaboratively in teams to solve a variety of practical business problems involving financial and actuarial risks.

¹ 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
- [Academic Success](#) for academic skills support.

² Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation.

³ An automatic short extension is available for some assessments. Apply through the [Service Connect Portal](#).

Delivery and Resources

Delivery. Weekly lectures and tutorials. Second half of session applied to an Australian aged-care ("Support at Home") case study through two assessments, plus three Taylor Fry industry workshops (Weeks 6, 8, 10). Assessment: Individual Report 25%, Group Presentation 25%, Final Exam 50%.

Technology. R / RStudio (assessed R code in the Individual Report; R Practice Workbook on iLearn). iLearn for all materials and submissions. Recording software (e.g. Zoom) for the Group Presentation. Data files provided on iLearn.

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Other requirements. Group formation, workshop participation, and on-time submission of both case studies (with a GenAI declaration) as set out in the assessment details.

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](#)
- [Assessment Procedure](#)
- [Complaints Resolution 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 connect.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

Academic Success

[Academic Success](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Ask a Study Coach](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the 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

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)

- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)
- [Student Advocacy](#) provides independent advice on MQ policies, procedures, and processes

Student Enquiries

Got a question? Ask us via the [Service Connect Portal](#), or contact [Service Connect](#).

IT Help

For help with University computer systems and technology, visit <https://students.mq.edu.au/support/technology/service-desk>.

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.

Unit information based on version 2026.06 of the [Handbook](#)