



# ACST8085

## Quantitative Methods for Risk Analysis

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

Unit Convenor

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Lecturer

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Credit points

10

Prerequisites

STAT6110 or STAT8310

Corequisites

Co-badged status

ACST3060

Unit description

This unit explores the use of statistical models in insurance: loss distributions with and without risk sharing, compound distributions and their applications in risk modelling, introduction to copulas, extreme value theory. The concepts underlying time series models and actuarial applications of time series models are also studied. Students gaining a weighted average of credit across all of ACST8084, ACST8085 and the CS2-related components of the assessment in ACST8086 (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:** Model insurance claims using loss distributions.

**ULO2:** Construct risk models with frequency and severity distributions.

**ULO3:** Use premium principles to price insurance products.

**ULO4:** Model dependence and extreme events by copulas and extreme value theory.

**ULO5:** Apply time series models to financial and economic variables.

**ULO6:** Apply the various statistical techniques and quantitative methods in solving practical insurance problems.

## General Assessment Information

### 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 |
|----------------------------------------------------------------------|-----------|--------|-------------|----------------------|-----------------|-------------|
| <u>Formal examination</u>                                            | 60%       | No     | Exam Period | Individual           | No              | Observed    |
| <u>Formal examination: Test</u>                                      | 20%       | No     | 16/09/2026  | Individual           | No              | Observed    |
| <u>Professional practice: Quantitative methods for risk analysis</u> | 20%       | No     | 30/10/2026  | Individual           | Yes             | Open AI     |

### Formal examination

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

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

Due: **Exam Period**

Weighting: **60%**

Groupwork/Individual: Individual

Short extension <sup>3</sup>: No

AI Approach: Observed

The purpose of this assessment is for you to formally demonstrate the expertise you have gained in this unit.

You will participate in a 2-hour exam 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: <https://students.mq.edu.au/study/assessment->

exams/exams

**Deliverable(s):** Formal exam.

Individual assessment.

On successful completion you will be able to:

- Model insurance claims using loss distributions.
- Construct risk models with frequency and severity distributions.
- Use premium principles to price insurance products.
- Model dependence and extreme events by copulas and extreme value theory.
- Apply time series models to financial and economic variables.

## Formal examination: Test

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

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

Due: **16/09/2026**

Weighting: **20%**

Groupwork/Individual: Individual

Short extension <sup>3</sup>: No

AI Approach: Observed

The purpose of this assessment is for you to demonstrate your ability to model insurance claims using loss distributions and to construct risk models using frequency and severity distributions.

You will participate in a formal test (approximately 90 minutes) during class time related to topics learnt in the semester.

### Skills in focus:

- Discipline knowledge
- Critical thinking and problem solving.

**Deliverable(s):** Class Test

Individual assessment

On successful completion you will be able to:

- Model insurance claims using loss distributions.
- Construct risk models with frequency and severity distributions.
- Use premium principles to price insurance products.
- Model dependence and extreme events by copulas and extreme value theory.

## Professional practice: Quantitative methods for risk analysis

Assessment Type <sup>1</sup>: Problem-based task

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

Due: **30/10/2026**

Weighting: **20%**

Groupwork/Individual: Individual

Short extension <sup>3</sup>: Yes

AI Approach: Open AI

The purpose of this assessment is for you to demonstrate problem-solving skills in R, focusing on modelling insurance claims with loss distributions, constructing risk models (frequency and severity), applying premium principles to price insurance, and modelling dependence or extreme events using copulas and extreme value theory.

You will complete a written assignment using R to analyse complex scenarios and present your findings.

**Skills in focus:**

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

**Deliverable(s):** Written response with R code.

Individual assessment

On successful completion you will be able to:

- Model insurance claims using loss distributions.
- Construct risk models with frequency and severity distributions.
- Use premium principles to price insurance products.
- Model dependence and extreme events by copulas and extreme value theory.
- Apply the various statistical techniques and quantitative methods in solving practical insurance problems.

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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
- [Academic Success](#) 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.

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

## Delivery and Resources

### Delivery

The unit will be delivered by weekly seminars.

### Resources

The unit material will be available for download from iLearn. Some references or recommended reading materials will be introduced whenever appropriate. Please refer to iLearn for details. Students will be required to use iLearn, R, PDF, Excel, Word, a non-programmable calculator and other resources to be mentioned on iLearn.

## 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](https://connect.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto: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.

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Unit information based on version 2026.03 of the [Handbook](#)