



# ACST8083

## Actuarial Statistics

Session 1, In person-scheduled-weekday, North Ryde 2025

*Department of Actuarial Studies and Business Analytics*

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#### Disclaimer

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## General Information

Unit convenor and teaching staff UC, lecturer Pavel Shevchenko <a href="mailto:pavel.shevchenko@mq.edu.au">pavel.shevchenko@mq.edu.au</a>
Credit points 10
Prerequisites STAT8310
Corequisites
Co-badged status This unit is co-badged ACST3061
Unit description This unit examines the use of statistical models in the general insurance context. Applications will include linear models and generalised linear models and Bayesian statistics including Credibility Theory. Students gaining a credit average across both ACST8083 and STAT8310 (minimum mark of 60 on both units) will satisfy the requirements for exemption from the professional subject CS1 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:** Apply the method of maximum likelihood estimation in a range of contexts and understand associated statistical distribution theory.
- ULO2:** Explain and apply both simple and multiple linear regression methodology.
- ULO3:** Develop an understanding of the theory and practice of generalised linear modelling (GLMs).
- ULO4:** Explain and apply the fundamental concepts of Bayesian statistics.
- ULO5:** Apply credibility theory to insurance problems.
- ULO6:** Apply these statistical techniques in solving practical insurance problems.

## General Assessment Information

### Late Assessment Submission Penalty (written assessments)

Unless a *Special Consideration* request has been submitted and approved, a 5% penalty (of the total possible mark) will be applied each day a written assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. Submission time for all written assessments is set at 11.55pm. A 1-hour grace period is provided to students who experience a technical concern.

For any late submissions of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, students need to submit an application for *Special Consideration*.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Formal and observed learning: Test</u>	15%	No	Week 7
<u>Formal and observed learning: Exam</u>	60%	No	During university examination period
<u>Skills development: Solving problems with R</u>	25%	No	Week 12

### Formal and observed learning: Test

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

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

Due: **Week 7**

Weighting: **15%**

The purpose of this assessment is for you to demonstrate your understanding and knowledge of key topics from the unit.

You will participate in a formal test.

**Deliverable:** Test Individual assessment

On successful completion you will be able to:

- Apply the method of maximum likelihood estimation in a range of contexts and understand associated statistical distribution theory.
- Explain and apply both simple and multiple linear regression methodology.

- Develop an understanding of the theory and practice of generalised linear modelling (GLMs).

## Formal and observed learning: Exam

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

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

Due: **During university examination period**

Weighting: **60%**

The purpose of this assessment is for you to demonstrate the expertise they have gained in Actuarial Statistics.

Students will participate in a 3-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.

**Deliverable:** Formal exam Individual assessment

On successful completion you will be able to:

- Apply the method of maximum likelihood estimation in a range of contexts and understand associated statistical distribution theory.
- Explain and apply both simple and multiple linear regression methodology.
- Develop an understanding of the theory and practice of generalised linear modelling (GLMs).
- Explain and apply the fundamental concepts of Bayesian statistics.
- Apply credibility theory to insurance problems.
- Apply these statistical techniques in solving practical insurance problems.

## Skills development: Solving problems with R

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

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

Due: **Week 12**

Weighting: **25%**

The purpose of this assessment is for you to develop your digital skills in using R to solve problems.

You will develop statistical modelling and data analysis skills using R. They will apply maximum likelihood estimation, implement linear regression methods, and explore generalised linear

models (GLMs). Additionally, they will apply Bayesian statistics and credibility theory to real-world problems, particularly in insurance and actuarial contexts.

**Skills in focus:** - Statistical modelling and estimation - Data analysis using R

**Deliverable:** Written report Individual assessment

On successful completion you will be able to:

- Apply the method of maximum likelihood estimation in a range of contexts and understand associated statistical distribution theory.
- Explain and apply both simple and multiple linear regression methodology.
- Develop an understanding of the theory and practice of generalised linear modelling (GLMs).
- Explain and apply the fundamental concepts of Bayesian statistics.
- Apply credibility theory to insurance problems.
- Apply these statistical techniques 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
- 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

Please refer to iLearn

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](https://policies.smq.edu.au) (<https://policies.smq.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.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [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 [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.

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Unit information based on version 2025.05 of the [Handbook](#)