



# ACST3060

## Quantitative Methods for Risk Analysis

Session 2, In person-scheduled-weekday, North Ryde 2022

*Department of Actuarial Studies and Business Analytics*

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## General Information

Unit convenor and teaching staff

Unit Convenor

Chong It Tan

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4ER 738

Credit points

10

Prerequisites

ACST358 or ACST3058

Corequisites

Co-badged status

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 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.

## 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.

## 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
<a href="#"><u>Assignment</u></a>	20%	No	24 August 11:55pm and 26 October 11:55pm
<a href="#"><u>Class Test</u></a>	20%	No	6 September 1pm
<a href="#"><u>Final Exam</u></a>	60%	No	University Examination Period

### Assignment

Assessment Type [1](#): Quantitative analysis task

Indicative Time on Task [2](#): 20 hours

Due: **24 August 11:55pm and 26 October 11:55pm**

Weighting: **20%**

There are two individual written assignments on problem solving using R.

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.

### Class Test

Assessment Type [1](#): Quiz/Test

Indicative Time on Task [2](#): 20 hours

Due: **6 September 1pm**

Weighting: **20%**

The test will be approximately 90 minutes, to be held during class time.

On successful completion you will be able to:

- Model insurance claims using loss distributions.
- Construct risk models with frequency and severity distributions.

## Final Exam

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

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

Due: **University Examination Period**

Weighting: **60%**

The final examination will be a three-hour written paper with ten minutes reading time, to be held during the University Examination period.

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.

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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

### Delivery and Resources

The timetable for classes can be found on:

### [Timetable 2022](#)

Detailed lecture notes and tutorial exercises are available on the unit's iLearn site.

The major references include:

Dickson, D. (2016). *Insurance Risk and Ruin*. Cambridge University Press.

Tsay, R. (2002). *Analysis of Financial Time Series*. John Wiley & Sons, Inc.

Nelsen, R. (2006). *An Introduction to Copulas*. Springer-Verlag New York.

Embrechts, P., Kluppelberg, C., Mikosch, T. (1997). *Modelling Extremal Events for Insurance and Finance*. Springer-Verlag Berlin Heidelberg.

## 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 [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)

## 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/>

## The Writing Centre

[The Writing Centre](#) 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 Enquiries

Got a question? Ask us via [AskMQ](#), 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.