



# ACST8040

## Quantitative Research Methods

Session 1, In person-scheduled-weekday, North Ryde 2023

*Department of Actuarial Studies and Business Analytics*

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## General Information

Unit convenor and teaching staff

Xian Zhou

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Credit points

10

Prerequisites

Admission to MActPrac and (STAT810 or STAT8310 or STAT806)

Corequisites

Co-badged status

Unit description

This unit focuses on statistical approaches for research in Business and Economics and related disciplines. Topics include a range of probability and statistical models, their theoretical basis, the assessment and evaluation of the models, and methods of statistical inference for data analysis. The unit will also consider applications of the above models and techniques to the actuarial practice discipline.

## 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:** Understand the theoretical basis of a range of statistical models used in actuarial research and the practice of modelling and inference using statistical models.

**ULO2:** Critique, replicate and extend basic actuarial research using statistical models.

**ULO3:** Ask questions and communicate problems relating to statistical models, and to explain and discuss ideas relating to implementation of statistical models.

**ULO4:** Explain how a variety of statistical models are used in actuarial research and how empirical results are communicated in practice.

**ULO5:** Use statistical software R to solve actuarial 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
<a href="#">Assignment 1</a>	20%	No	24 March 2023
<a href="#">Assignment 2</a>	40%	No	5 May 2023
<a href="#">Assignment 3</a>	40%	No	5 June 2023

### Assignment 1

Assessment Type <sup>1</sup>: Problem set

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

Due: **24 March 2023**

Weighting: **20%**

Assignment 1 consists of objective response questions requiring explanations in appropriate words and/or mathematical expressions.

On successful completion you will be able to:

- Understand the theoretical basis of a range of statistical models used in actuarial research and the practice of modelling and inference using statistical models.
- Critique, replicate and extend basic actuarial research using statistical models.
- Ask questions and communicate problems relating to statistical models, and to explain and discuss ideas relating to implementation of statistical models.

## Assignment 2

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 30 hours

Due: **5 May 2023**

Weighting: **40%**

Assignment 2 consists of problem-solving questions requiring detailed solutions

On successful completion you will be able to:

- Understand the theoretical basis of a range of statistical models used in actuarial research and the practice of modelling and inference using statistical models.
- Critique, replicate and extend basic actuarial research using statistical models.
- Ask questions and communicate problems relating to statistical models, and to explain and discuss ideas relating to implementation of statistical models.
- Explain how a variety of statistical models are used in actuarial research and how empirical results are communicated in practice.

## Assignment 3

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 30 hours

Due: **5 June 2023**

Weighting: **40%**

Assignment 3 consists of problem-solving questions requiring detailed solutions including numerical solutions using statistical software R.

On successful completion you will be able to:

- Understand the theoretical basis of a range of statistical models used in actuarial research and the practice of modelling and inference using statistical models.
- Critique, replicate and extend basic actuarial research using statistical models.
- Ask questions and communicate problems relating to statistical models, and to explain and discuss ideas relating to implementation of statistical models.
- Explain how a variety of statistical models are used in actuarial research and how empirical results are communicated in practice.

- Use statistical software R to solve actuarial 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

### Classes

- This unit is taught through 3 hours of combined lectures/tutorials per week.
- If you are enrolled into the "Online-flexible" attendance mode, you are not required to register into any classes as there is no real-time live online class. A lecture recording will- be made available to students after the on-campus class is held so that you can study at your own pace.
- The timetable for classes can be found on the University web site at:  
<http://www.timetables.mq.edu.au/>

### Unit Web Page

- The web page for this unit can be found at: <http://ilearn.mq.edu.au>

### Technology Used and required

- You will need access to the internet to obtain course information and download teaching materials from the unit website.
- It is your responsibility to check the unit website regularly to make sure that you are up to date with the information for the unit.
- The statistical package R will be used to calculate numerical results from time to time.

### Required and Recommended Texts and/or Materials

- Lecture Notes are the required materials and will be posted on the website before the lectures.
- Relevant references will be provided in Lecture Notes as recommended materials. Some of them will be posted on the website.

## Unit Schedule

**Week 1:** Nonparametric statistical methods; background knowledge

**Week 2:** One-sample location problem

**Week 3:** Estimation of location parameters; Two-sample location problem

**Week 4:** Two-sample dispersion and other problems

**Week 5:** One-way layout; Assignment 1

**Week 6:** One-way layout

**Week 7:** Two-way layout

**Week 8:** Two-way layout

**Week 9:** Independence problem

**Week 10:** Independence problem; Assignment 2

**Week 11:** Regression problem

**Week 12:** Bootstrap estimation

**Week 13:** Revision; Assignment 3

**Note:** This is only a tentative schedule. The actual schedule will be adjusted from time to time in accordance with the progress of lectures.

## 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](http://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 Advocacy](#) provides independent advice on MQ policies, procedures, and

processes

## 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.