ACST8083

Actuarial Statistics

Session 1, In person-scheduled-weekday, North Ryde 2022

Department of Actuarial Studies and Business Analytics

Contents

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General Information

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Credit points
10

Prerequisites
STAT806 or STAT810 or STAT8310

Corequisites

Co-badged status

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

Assessment criteria for all assessment tasks will be provided on the unit iLearn site.

It is the responsibility of students to view their marks for each within-session-assessment on iLearn within 20 days of posting. If there are any discrepancies, students must contact the unit convenor immediately. Failure to do so will mean that queries received after the release of final results regarding assessment tasks (not including the final exam mark) will not be addressed.

Late submissions of assessments Unless a Special Consideration request has been submitted and approved, no extensions will be granted. There will be a deduction of 10% of the total available assessment-task marks made from the total awarded mark for each 24-hour period or part thereof that the submission is late. Late submissions will only be accepted up to 96 hours after the due date and time.

No late submissions will be accepted for timed assessments – e.g., quizzes, online tests.

Table 1: Penalty calculation based on submission time

Submission time after the due date (including weekends)	Penalty (% of available assessment task mark)	Example: for a non-timed assessment task marked out of 30
< 24 hours	10%	10% x 30 marks = 3-mark deduction
24-48 hours	20%	20% x 30 marks = 6-mark deduction
48-72 hours	30%	30% x 30 marks = 9-mark deduction
72-96 hours	40%	40% x 30 marks = 12-mark deduction
> 96 hours	100%	Assignment won't be accepted

Special Consideration

To request an extension on the due date/time for a timed or non-timed assessment task, you must submit a Special Consideration application. An application for Special Consideration does not guarantee approval.

The approved extension date for a student becomes the new due date for that student. The late submission penalties above then apply as of the new due date.

Assessment Tasks

Name	Weighting	Hurdle	Due
Class Test	20%	No	Week 7
Assignment 1	10%	No	Week 9
Assignment 2	10%	No	Week 12
Final Exam	60%	No	University Examination Period 6 to 24 June

Class Test

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 20 hours
Due: **Week 7**
Weighting: **20%**

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

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).
- Apply these statistical techniques in solving practical insurance problems.

Assignment 1

Assessment Type [1]: Quantitative analysis task
Indicative Time on Task [2]: 10 hours
Due: **Week 9**
Weighting: **10%**

This is an individual assignment which focuses on problem solving using R.

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).

- Apply these statistical techniques in solving practical insurance problems.

Assignment 2

Assessment Type [1]: Quantitative analysis task
Indicative Time on Task [2]: 10 hours
Due: **Week 12**
Weighting: **10%**

This is an individual assignment which focuses on problem solving using R.

On successful completion you will be able to:

- Explain and apply the fundamental concepts of Bayesian statistics.

- Apply credibility theory to insurance problems.

- Apply these statistical techniques in solving practical insurance problems.

Final Exam

Assessment Type [1]: Examination
Indicative Time on Task [2]: 28 hours
Due: **University Examination Period 6 to 24 June**
Weighting: **60%**

The final examination will be closed book, 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:

- 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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[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

- the Writing Centre 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

Delivery and Resources

Delivery

Please refer to iLearn for details.

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.

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.

Unit Schedule

Please refer to iLearn.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (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). 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) 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 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/

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/.

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 2022.04 of the Handbook