



ACST3056

Mathematical Theory of Risk

Session 1, Weekday attendance, North Ryde 2020

Department of Actuarial Studies and Business Analytics

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General Information

Unit convenor and teaching staff

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Please see iLearn

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Credit points

10

Prerequisites

130cp at 1000 level or above including STAT272 or STAT2372

Corequisites

Co-badged status

Unit description

This unit examines the use of statistical models in the insurance context. Statistical models of the number of claims and the sizes of the claims are studied. These models are used as a basis for the study of risk theory, ruin theory and the effect of reinsurance. Decision theory and simulation are also studied. Students gaining a Credit average in both ACST3056 and ACST3057 (minimum mark of 60) will satisfy the requirements for exemption from professional subject CT6 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: Analyse and model insurance claims using loss distributions and Bayesian analysis.

ULO3: Apply premium principles to price insurance products.

ULO2: Perform Monte Carlo simulation for insurance models.

ULO4: Construct risk models with frequency and severity distributions and apply ruin

theory to insurance problems.

ULO5: Apply credibility theory and decision theory to insurance problems.

Assessment Tasks

Coronavirus (COVID-19) Update

Assessment details are no longer provided here as a result of changes due to the Coronavirus (COVID-19) pandemic.

Students should consult [iLearn](#) for revised unit information.

[Find out more about the Coronavirus \(COVID-19\) and potential impacts on staff and students](#)

General Assessment Information

Assignment

Due: **Week 3 and Week 12** Weighting: **20%**

There are two written assignments due in Week 3 (5%) and Week 12 (15%). Marks will be granted for accuracy and clarity of the work submitted.

No extensions will be granted. Students who have not submitted the task prior to the deadline will be awarded a mark of zero (0) for the task, except for cases in which an application for special consideration is made and approved.

Class Test

Due: **Week 7** Weighting: **20%**

You are permitted one (1) A4 page of paper containing reference material printed on both sides. The material may be handwritten or typed. The page will not be returned to you at the end of the class test.

Students who do not attend the class test will be awarded a mark of zero (0) for the test, except for cases in which an application for special consideration is made and approved.

Final exam

Due: **Exam period** Weighting: **60%**

A three-hour (3) written exam will be held during the normal university exam period. Questions will cover the entire unit. Marks will be granted for accuracy and clarity of the work shown.

You are permitted one (1) A4 page of paper containing reference material printed on both sides. The material may be handwritten or typed. The page will not be returned to you at the end of the final exam. Non-programmable calculators with no text-retrieval capacity are permitted.

Students who do not attend the final exam will be awarded a mark of zero (0) for the exam, except for cases in which an application for special consideration is made and approved.

Delivery and Resources

Coronavirus (COVID-19) Update

Any references to on-campus delivery below may no longer be relevant due to COVID-19.

Please check here for updated delivery information: https://ask.mq.edu.au/account/pub/display/unit_status

The timetable for classes can be found on the University website at:

<https://timetables.mq.edu.au/2020/>

Lecture notes are available for download from iLearn. You will need to print the lecture notes and bring them to classes to complete.

From Week 8 onward, the required textbook is:

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

Other references include:

Hossack, I.B., Pollard, J.H. and Zehnwirth, B. (1999). Introductory Statistics with Applications in General Insurance. 2nd Edition. Cambridge University Press.

Klugman, S.A., Panjer, H.H. and Willmot, G.E. (2004). Loss Models: From Data to Decisions. 2nd Edition. Wiley: New York.

Casualty Actuarial Society (2001). Foundations of Casualty Actuarial Science. 4th Edition.

Students will be required to use iLearn, Excel, PDF, Word, and a non-programmable calculator.

Unit Schedule

Coronavirus (COVID-19) Update

The unit schedule/topics and any references to on-campus delivery below may no longer be relevant due to COVID-19. Please consult [iLearn](#) for latest details, and check here for updated delivery information: https://ask.mq.edu.au/account/pub/display/unit_status

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| Week 1 | Loss Models I |
| Week 2 | Loss Models II |
| Week 3 | Loss Models III |
| Week 4 | Loss Models IV |
| Week 5 | Reinsurance and Deductibles |
| Week 6 | Simulation |
| Week 7 | Class Test |
| Week 8 | Premium Principles |
| Week 9 | Risk Models |
| Week 10 | Ruin Theory |
| Week 11 | Ruin Theory with Reinsurance |
| Week 12 | Credibility Theory |
| Week 13 | Decision Theory |

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). 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](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4*

December 2017 and replaces the Disruption to Studies Policy.)

Students seeking more policy resources can visit the [Student Policy Gateway](https://students.mq.edu.au/support/study/student-policy-gateway) (<https://students.mq.edu.au/support/study/student-policy-gateway>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central>).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/study/getting-started/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

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- [Getting help with your assignment](#)
- [Workshops](#)
- [StudyWise](#)
- [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

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

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.