



ACST885

Quantitative Methods for Risk Analysis

S2 Day 2019

Department of Actuarial Studies and Business Analytics

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General Information

Unit convenor and teaching staff
Unit convenor and lecturer
Jackie Li
jackie.li@mq.edu.au
Contact via Email
E4A 610
Mondays 12pm-1pm during teaching weeks

Credit points
4

Prerequisites
STAT810 or STAT806

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.

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:

Model insurance claims using loss distributions, and develop programming and research skills associated with this learning outcome

Construct risk models with frequency and severity distributions, and develop programming and research skills associated with this learning outcome

Use premium principles to price insurance products, and develop programming and research skills associated with this learning outcome

Apply time series models to financial and economic variables, and develop programming and research skills associated with this learning outcome

Model dependence and extreme events by copulas and extreme value theory, and develop programming and research skills associated with this learning outcome

General Assessment Information

It is the responsibility of students to view their marks for each within session assessment on iLearn within 20 working 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 marks (not including the final exam mark) will not be addressed.

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

Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Assignment</u>	20%	No	Week 3 and Week 12
<u>Class Test</u>	20%	No	Week 7
<u>Final exam</u>	60%	No	Exam period

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. There will be a deduction of 10% of the total available marks made from the total awarded mark for each 24 hour period or part thereof that the submission is late (for example, 25 hours late in submission – 20% penalty). This penalty does not apply for cases in which an application for special consideration is made and approved. No submission will be accepted after solutions are posted.

Assessment criteria will be provided on iLearn. Assignment submission is via iLearn.

On successful completion you will be able to:

- Model insurance claims using loss distributions, and develop programming and research skills associated with this learning outcome
- Construct risk models with frequency and severity distributions, and develop programming and research skills associated with this learning outcome

- Use premium principles to price insurance products, and develop programming and research skills associated with this learning outcome
- Apply time series models to financial and economic variables, and develop programming and research skills associated with this learning outcome
- Model dependence and extreme events by copulas and extreme value theory, and develop programming and research skills associated with this learning outcome

Class Test

Due: **Week 7**

Weighting: **20%**

The class test covers the lecture content in Week 1 to Week 5. Students will have 1 hour and 15 minutes to complete the test. Marks will be granted for accuracy and clarity of the work submitted. It will be conducted in a lecture.

You are permitted to bring 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. Non-programmable calculators with no text-retrieval capacity are permitted.

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.

Assessment criteria will be provided on iLearn.

On successful completion you will be able to:

- Model insurance claims using loss distributions, and develop programming and research skills associated with this learning outcome
- Construct risk models with frequency and severity distributions, and develop programming and research skills associated with this learning outcome

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 to bring 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.

You are given ten minutes reading time.

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.

On successful completion you will be able to:

- Model insurance claims using loss distributions, and develop programming and research skills associated with this learning outcome
- Construct risk models with frequency and severity distributions, and develop programming and research skills associated with this learning outcome
- Use premium principles to price insurance products, and develop programming and research skills associated with this learning outcome
- Apply time series models to financial and economic variables, and develop programming and research skills associated with this learning outcome
- Model dependence and extreme events by copulas and extreme value theory, and develop programming and research skills associated with this learning outcome

Delivery and Resources

The timetable for classes can be found on:

<https://timetables.mq.edu.au/2019/>

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

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.

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

Unit Schedule

Week 1 Loss Models

Week 2 Loss Models

Week 3 Loss Models

Week 4	Risk Models
Week 5	Risk Models
Week 6	Risk Models
Week 7	Premium Principles
Week 8	Extreme Value Theory
Week 9	Extreme Value Theory
Week 10	Copulas
Week 11	Copulas
Week 12	Time Series Models
Week 13	Time Series Models
TBC in lectures	

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.*)

Undergraduate 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 \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).

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

Supplementary exams

Information regarding supplementary exams, including dates, is available at:

http://www.businessandconomics.mq.edu.au/current_students/undergraduate/how_do_i/disruption_to_studies

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 improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

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.

Graduate Capabilities

PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

Learning outcomes

- Model insurance claims using loss distributions, and develop programming and research skills associated with this learning outcome
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- Apply time series models to financial and economic variables, and develop programming and research skills associated with this learning outcome
- Model dependence and extreme events by copulas and extreme value theory, and develop programming and research skills associated with this learning outcome

Assessment tasks

- Assignment
- Class Test
- Final exam

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

- Model insurance claims using loss distributions, and develop programming and research skills associated with this learning outcome
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Assessment tasks

- Assignment
- Class Test
- Final exam

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcomes

- Model insurance claims using loss distributions, and develop programming and research skills associated with this learning outcome
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