ACST359

Actuarial Modelling

S2 Day 2019

Department of Actuarial Studies and Business Analytics

Contents

General Information

Unit convenor and teaching staff
Unit convenor and teaching staff
Jackie Li
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E4A 610
Mondays 4pm-5pm during teaching weeks

Teaching staff
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Refer to iLearn

Credit points
3

Prerequisites
ACST358

Corequisites

Co-badged status

Unit description
In this unit industry participants work together with students throughout the session. The unit integrates and synthesises the knowledge learnt over the actuarial degree and foreshadows the transition to a professional career. Students will use survival models to estimate decrement rates from actual experience, compare these with the rates in standard tables, and prepare new standard tables. As part of the construction of new tables, consideration will be given to risk factors and the effects of selection; design of data collection; statistical analysis and graduation of the observed rates; and testing of the graduation. The unit concludes with a review of actuarial concepts covered in the three-year undergraduate actuarial program and an introduction to the 'actuarial control cycle', a conceptual framework of the processes for developing and managing financial enterprises and products. Students develop graduate level critical analysis, problem solving and communication skills, and an awareness of the challenges facing businesses. Students gaining a grade of credit or higher in both ACST358 and ACST359 are eligible for exemption from subject CT4 of the professional exams of the Institute of Actuaries of Australia.

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:

Describe the principles of actuarial modelling and apply them to common actuarial problems both individually and in a team environment.
Identify the most significant risks for various types of financial institutions and compare ways of managing these risks.
Discuss the concept of the Actuarial Control Cycle and apply it to a variety of straightforward practical commercial situations.
Describe how to test crude estimates for consistency with a standard table or a set of graduated estimates and describe the process of graduation.
Use the binomial and Poisson models for mortality. Derive the maximum likelihood estimator for the model parameter. Describe how to estimate transition intensities depending on age, exactly or using the census approximation.

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 Tasks

Name	Weighting	Hurdle	Due
Class Test	20%	No	Week 7
Group Assignment	20%	No	Week 3 and Weeks 8 to 13
Final Examination	60%	No	Examination Period

Class Test

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

Test will cover Weeks 1 to 5 materials. You will have 1 hour and 15 minutes to complete the test.

It will be conducted in a lecture.

No extensions will be granted. Students who do not attend the test will be awarded a mark of 0, unless an application for special consideration is made and approved.

Assessment criteria will be provided on iLearn.

On successful completion you will be able to:

- Describe how to test crude estimates for consistency with a standard table or a set of graduated estimates and describe the process of graduation.
- Use the binomial and Poisson models for mortality. Derive the maximum likelihood estimator for the model parameter. Describe how to estimate transition intensities depending on age, exactly or using the census approximation.

Group Assignment

Due: **Week 3 and Weeks 8 to 13**
Weighting: **20%**

An assignment requiring data analysis and investigation along with a written report and presentation will be required. Note that 50% of the marks will be allocated to individual performance.

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:

- Describe the principles of actuarial modelling and apply them to common actuarial problems both individually and in a team environment.
- Identify the most significant risks for various types of financial institutions and compare ways of managing these risks.
- Discuss the concept of the Actuarial Control Cycle and apply it to a variety of straightforward practical commercial situations.

Final Examination

Due: **Examination Period**
Weighting: **60%**

A three-hour written exam will be held during the normal university examination period. Questions will cover the entire unit.

You are permitted ONE 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 examination.

You are given ten minutes reading time.

On successful completion you will be able to:

- Describe the principles of actuarial modelling and apply them to common actuarial problems both individually and in a team environment.
- Identify the most significant risks for various types of financial institutions and compare ways of managing these risks.
- Discuss the concept of the Actuarial Control Cycle and apply it to a variety of straightforward practical commercial situations.
- Describe how to test crude estimates for consistency with a standard table or a set of graduated estimates and describe the process of graduation.
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Delivery and Resources

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

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

Tutorials will commence in Week 2 of the session.

Lecture handouts are available for download from the website in advance of lecture classes. It is expected that you will print these notes and bring them to the relevant lectures.

You will be required to use the teaching website, Word, PDF, R, and Excel.

Course materials are available on iLearn. To access the website, go to http://ilearn.mq.edu.au and log in using your usual login and password.

Unit Schedule

Week Topic

1 Exposed to Risk

2 Exposed to Risk

3 Exposed to Risk

4 Exposed to Risk

5 Statistical Tests

6 Graduation

7 Class Test

8 Control Cycle

9 Control Cycle

10 Control Cycle

11 Control Cycle

12 Control Cycle

13 Revision

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). 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). 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).

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.businessandeconomics.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

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them

competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Describe the principles of actuarial modelling and apply them to common actuarial problems both individually and in a team environment.
- Identify the most significant risks for various types of financial institutions and compare ways of managing these risks.
- Discuss the concept of the Actuarial Control Cycle and apply it to a variety of straightforward practical commercial situations.
- Describe how to test crude estimates for consistency with a standard table or a set of graduated estimates and describe the process of graduation.
- Use the binomial and Poisson models for mortality. Derive the maximum likelihood estimator for the model parameter. Describe how to estimate transition intensities depending on age, exactly or using the census approximation.

Assessment tasks

- Class Test
- Group Assignment
- Final Examination

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Describe the principles of actuarial modelling and apply them to common actuarial problems both individually and in a team environment.
- Identify the most significant risks for various types of financial institutions and compare ways of managing these risks.
- Discuss the concept of the Actuarial Control Cycle and apply it to a variety of

straightforward practical commercial situations.
- Describe how to test crude estimates for consistency with a standard table or a set of graduated estimates and describe the process of graduation.
- Use the binomial and Poisson models for mortality. Derive the maximum likelihood estimator for the model parameter. Describe how to estimate transition intensities depending on age, exactly or using the census approximation.

Assessment tasks

- Class Test
- Group Assignment
- Final Examination

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- Describe the principles of actuarial modelling and apply them to common actuarial problems both individually and in a team environment.
- Identify the most significant risks for various types of financial institutions and compare ways of managing these risks.
- Discuss the concept of the Actuarial Control Cycle and apply it to a variety of straightforward practical commercial situations.

Assessment task

- Group Assignment

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcomes

- Describe the principles of actuarial modelling and apply them to common actuarial problems both individually and in a team environment.
- Identify the most significant risks for various types of financial institutions and compare ways of managing these risks.
- Discuss the concept of the Actuarial Control Cycle and apply it to a variety of straightforward practical commercial situations.

Assessment tasks

- Group Assignment
- Final Examination