ACST8086

Actuarial Modelling

Session 2, Online-flexible-In person assessment, North Ryde 2022

Department of Actuarial Studies and Business Analytics

Contents

General Information

Unit convenor and teaching staff Unit Convenor Alan Xian alan.xian@mq.edu.au
Credit points 10
Prerequisites STAT806 or STAT810 or STAT8310
Corequisites
Co-badged status
Unit description Survival models will be used to estimate decrement rates from actual experience, compare these with standard rates, and prepare new tables. In constructing new tables, consideration will be given to risk factors; selection; data collection; graduation; and testing the graduation. The concept of actuarial modelling will be discussed. Methods for mortality projection will be described and applied. Machine learning will be introduced. The 'actuarial control cycle', a conceptual framework of the processes for developing and managing financial enterprises and products, will be studied. Students gaining a weighted average of credit across all of ACST8084, ACST8085 and the CS2-related components of the assessment in ACST8086 (minimum mark of 60% on all three components) will satisfy the requirements for exemption from the professional subject CS2 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: Examine and employ a variety of exposed to risk, graduation and mortality projection techniques.

ULO2: Develop an understanding of aspects of the theory and practice of statistical learning methods.

ULO3: Model and critically analyse scenarios involving financial risks for various types of

financial institutions and compare ways of managing these risks.

ULO4: Discuss the concept of the Actuarial Control Cycle and apply it to solve a variety of practical business problems involving financial and actuarial risks.

ULO5: Identify and apply the relevant statistical techniques in solving practical actuarial problems within the actuarial control cycle framework.

ULO6: Explain and justify decision making to different stakeholders using the actuarial control cycle framework

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
Assignment	30%	No	Week 8
Class Test	30%	No	Week 9
Game and Discussion Forum Posts	5%	No	Weeks 9 - 13
Group Presentation	5%	No	Weeks 11 - 13
Final Exam	30%	No	Exam Period

Assignment

Assessment Type [1]: Project
Indicative Time on Task [2]: 25 hours
Due: **Week 8**
Weighting: **30%**

This is an individual assignment which focuses on actuarial modelling using R.

On successful completion you will be able to:

- Examine and employ a variety of exposed to risk, graduation and mortality projection techniques.
- Develop an understanding of aspects of the theory and practice of statistical learning methods.

Class Test

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 15 hours
Due: **Week 9**
Weighting: **30%**

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

On successful completion you will be able to:

- Examine and employ a variety of exposed to risk, graduation and mortality projection techniques.
- Develop an understanding of aspects of the theory and practice of statistical learning methods.

Game and Discussion Forum Posts

Assessment Type [1]: Participatory task
Indicative Time on Task [2]: 5 hours
Due: **Weeks 9 - 13**
Weighting: **5%**

Seminar and discussion forum participation with game questions/answers

On successful completion you will be able to:

- Model and critically analyse scenarios involving financial 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 solve a variety of practical business problems involving financial and actuarial risks.
- Identify and apply the relevant statistical techniques in solving practical actuarial

problems within the actuarial control cycle framework.

Group Presentation

Assessment Type [1]: Presentation
Indicative Time on Task [2]: 5 hours
Due: **Weeks 11 - 13**
Weighting: **5%**

The presentation is an oral presentation to the class.

On successful completion you will be able to:

- Model and critically analyse scenarios involving financial 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 solve a variety of practical business problems involving financial and actuarial risks.
- Identify and apply the relevant statistical techniques in solving practical actuarial problems within the actuarial control cycle framework.
- Explain and justify decision making to different stakeholders using the actuarial control cycle framework

Final Exam

Assessment Type [1]: Examination
Indicative Time on Task [2]: 15 hours
Due: **Exam Period**
Weighting: **30%**

The final examination will be closed book, a one and half hours written paper with ten minutes reading time, to be held during the University Examination period.

On successful completion you will be able to:

- Model and critically analyse scenarios involving financial 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 solve a variety of practical business problems involving financial and actuarial risks.
- Identify and apply the relevant statistical techniques in solving practical actuarial

problems within the actuarial control cycle framework.

- Explain and justify decision making to different stakeholders using the actuarial control cycle framework

---

[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

Learning and Teaching Activities

The content for each week will comprise of a brief introductory recording, a live lecture, and a set of tutorial questions (Problem Sets).

Please note that tutorials will only be offered in selected weeks throughout the session. A list of available lecture and tutorial class times is available at: http://www.timetables.mq.edu.au. More details will be available on iLearn. It is the responsibility of individual students to stay up to date with the material.

Lectures

An introductory recording for each topic will be made available on ECHO at the start of each week. The accompanying notes for this introductory recording will be available in the week of the lecture, in the iLearn weekly tabs. Students are expected to watch each recording in preparation for the live (F2F or online) Lecture Review the following week.

The live Lecture Review session during the week (see iLearn for details) will further explore the ideas introduced in the lecture, giving greater depth of discussion on the topics in this unit. These sessions will also provide students an opportunity to ask specific questions relating to the associated lecture.

Tutorials

Students will need to register for a tutorial. Tutorials are considered compulsory but no marks are allocated for attendance/participation. Tutorials will be available for most, but not all weeks of the session. Please see the tutorial schedule available on iLearn.

Tutorial enrolment or change of tutorial can be made through *eStudent* in the first two weeks of the session. No tutorial changes are allowed after Week 2. Students should attend their allocated tutorial, but exceptions may occur on a one-off basis. That is, where circumstances prevent you attending your own tutorial in a given week, you may attend an alternative tutorial if room available. Do **NOT** email the unit convenor or any member of the

teaching team regarding changing of registered tutorials. We are unable to do this for you.

Students are expected to complete the '*Tutorial Questions*' as a self-directed study activity before attending a tutorial. Solutions will be posted after the week in which the questions are discussed. Additional learning support will be available in tutor consultation times, and in PAL sessions.

Recommended Text

There are no recommended texts for this course. Materials will be provided as required (see iLearn for details).

Technology Used and Required

Calculator

A calculator will be required for the various calculations throughout the session, and for the Final Examination. **Note**: As a general rule, students are expected to clearly show all steps/working in their solutions to 'calculation' questions.

Calculators need the following minimum functionality: x^y or ^, *1/x* and *log* or *ln* functions, and a memory. Non-programmable financial calculators are permitted but it is not a requirement to use a financial calculator.

Students are expected to by Week 1 be familiar at least with the basic operation of their calculator.

Computing

Students are expected to by Week 1 be familiar at least with the basic operation of their computing device, ensuring the device is *Wi-Fi* enabled to access lecture activities in 'real-time'.

Software

Students should have access to *Excel* software (version 2013 or more recent), and are expected to in Week 1 have viewed the '*Excel* Tutorials' in *iLearn* '*Kick-Start*'. *Excel* will be used in lectures and tutorials from Week 1. An excel assignment is part of the assessment for this unit. A review of *Excel* fundamentals and time value of money functionality is scheduled for the Week 5 lecture. We strongly recommend students engage with *Excel* from Week 1.

See https://students.mq.edu.au/support/technology/service-desk/office-365 for instructions on how to get your free copy of Microsoft Office.

Knowledge of Maths

A background of at least HSC General Mathematics or equivalent numerical competency is assumed. A small self-diagnostic online Maths Revision exercise is available on iLearn. The self-diagnostic exercise is not assessable, but may assist in providing an indication of your understanding of the type of mathematics functions we will use in the unit. Students requiring assistance with the unit's mathematical elements throughout the term may consult with the *Numeracy Centre* team during appointed hours (no appointment needed). Students without HSC General Mathematics or equivalent, are best advised to not undertake ACST1001 until

completing a math unit (MATH1000 or ECON1031).

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.