ACST8084

Survival Models

Session 1, Weekday attendance, North Ryde 2020

Department of Actuarial Studies and Business Analytics

Contents

General Information

Unit convenor and teaching staff
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Credit points
10

Prerequisites
STAT810 or STAT8310 or STAT806

Corequisites

Co-badged status

Unit description
This unit provides sophisticated statistical and probabilistic models for survival, sickness, insurance losses and other actuarial problems based on survival data. Techniques of survival analysis are used to estimate survival and loss distributions and evaluate risk factors in actuarial applications. Methods of both nonparametric and parametric estimation are utilised. Advanced models based on Markov chains and processes will be introduced to capture the features of stochastic transitions between different survival or loss states and to estimate the transition rates. Methods for valuing cashflows that are contingent upon multiple transition events and methods of projecting and valuing such expected cashflows will also be covered. 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: Apply and analyse different types of survival models and justify their connections

with practical actuarial problems.

ULO3: Demonstrate an understanding of the concepts and properties of Markov processes.

ULO2: Apply statistical inference technique to estimate parameters and probability distributions of survival models.

ULO5: Perform valuation of cashflows that are contingent upon multiple transition / decrement events.

ULO4: Solve Markov transition probabilities via matrix theory and differential equations.

ULO6: Apply the various statistical techniques and quantitative methods in solving practical 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

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.

Special Consideration

Where a Special Consideration application is approved, the student may be offered an alternative assessment or may receive a mark based on the percentage mark achieved by the student in one or more other assessment tasks, at the Unit Convenor's discretion.

Late Penalties

Tasks 10% or less – No extensions will be granted. Students who have not submitted the task prior to the deadline will be awarded a mark of 0 for the task, except for cases in which an application for special consideration is made and approved.

Tasks above 10% - 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 have been posted.

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

Classes

- This unit is taught through 2 hours of lectures and 2 hours of workshops/tutorials per week.
- The timetable for classes can be found on the University web site at: http://www.timetables.mq.edu.au/
- Workshops/tutorials start in Week 1.

Unit Web Page

- The web page for this unit can be found at: http://ilearn.mq.edu.au

Technology Used and required

• You will need access to the internet to obtain course information and download teaching materials from the unit website.

• It is your responsibility to check the unit website regularly to make sure that you are upto-date with the information for the unit.

• The statistical package R will be extenstively employed in this unit. The application of R is essential to completing the Individual Assignment.

• Application of R will be introduced in the weekly workshop/tutorial.

• Students are expected to understand and properly use R outputs in the Mid-term test and Final exam.

Required and Recommended Texts and/or Materials

• Lecture Notes are the required materials and will be posted on the website before the lectures.

• The main additional reading materials are the ActEd CS2 notes. This will also be used as background reading for ACST8086.

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

Week 1: Probability models (revision); Survival analysis

Week 2: Estimation of survival distributions

Week 3: Variance estimation and confidence intervals

Week 4: Cox proportional hazards models

Week 5: Cox proportional hazards models; Stochastic processes;

Week 6: Markov chains

Week 7 (last week before semester break): Markov chains; **Due of Individual Assignment**

Week 8 (first week after semester break): Markov jump processes; **Mid-term test**

Week 9: Markov jump processes

Week 10: Applications of Markov processes

Week 11: Applications of Markov processes

Week 12: Competitive risks and multiple decrement tables

Week 13: Revision

Note: This is only a tentative schedule. The actual schedule will be adjusted from time to time in accordance with the progress of 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). 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). 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

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.

Changes since First Published

Date	Description
07/02/2020	Mionr adjustments to general assessment information