Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.
General Information

Unit convenor and teaching staff
Unit Convenor
Jiwook Jang
jiwook.jang@mq.edu.au
E4A 613
Dialogue Tool on the teaching website

Unit Convenor
Chong It Tan
chongit.tan@mq.edu.au
E4A 609
Thursdays 2pm-3pm during teaching weeks

Credit points
4

Prerequisites
ACST859

Corequisites

Co-badged status

Unit description
Topics covered in this unit include: - multiple decrement models; - valuation of benefits and contributions under superannuation plans; - pricing and valuation of policies involving two lives; - cash flow and profit test models for life insurance products including traditional products, unbundled unit linked contracts and disability income products; - pricing and valuation for future contingent liabilities; and - the effect of the pricing and valuation basis on the emergence of profit. Students gaining a grade of credit or higher in both ACST859 and this unit may apply for exemption from subject CT5 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 http://students.mq.edu.au/student_admin/enrolmentguide/academicdates/
Learning Outcomes

1. Extend the techniques learned in ACST255/859 to permit the calculation and analysis of cashflows dependent upon the death or survival of either or both of two lives, and cashflows dependent upon a fixed term as well as age.

2. Describe, develop, apply and analyse methods used to model cashflows contingent upon competing risks; construct and use multiple decrement service tables, and demonstrate understanding of the relationship with associated single decrement tables.

3. Describe, apply and analyse the technique of discounted emerging costs for use in pricing,-reserving and assessing profitability, for superannuation funds and related multiple decrement tables, traditional life insurance contracts and unit linked policies.

4. Define, calculate and analyse the use of various single figure indices, explain the rationale behind the indices, and explain the advantages and disadvantages of the indices for summarising and comparing actual experience in different scenarios.

5. Describe and illustrate the principal forms of heterogeneity within a population and the ways in which selection can occur. Demonstrate the ability to identify key unit concepts and to integrate them to solve, create and analyse novel problems.

General Assessment Information

Assessment Criteria

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

GradeBook

Assignment and class test marks are available on GradeBook. 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.

Feedback Prior to the Census Date

Self-assessment exercise question(s) will be released in Week 3 for feedback prior to the census date. Its answer will be also provided before the census date in Week 4.

Assessment Tasks

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Test</td>
<td>20%</td>
<td>13 April</td>
</tr>
<tr>
<td>Assignment</td>
<td>20%</td>
<td>1 June 12:00noon</td>
</tr>
</tbody>
</table>
**Class Test**

Due: **13 April**  
Weighting: **20%**

Class test will be 95 minutes written papers with no reading time, held during the tutorial or lecture time. It will be confirmed in classes.

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 be returned to the students at the end of the class test. Nonprogrammable calculators with no text-retrieval capacity are allowed. Dictionaries are not permitted.

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 disruptions to studies is made and approved.

This Assessment Task relates to the following Learning Outcomes:

- Extend the techniques learned in ACST255/859 to permit the calculation and analysis of cashflows dependent upon the death or survival of either or both of two lives, and cashflows dependent upon a fixed term as well as age.
- describe and illustrate the principal forms of heterogeneity within a population and the ways in which selection can occur. Demonstrate the ability to identify key unit concepts and to integrate them to solve, create and analyse novel problems.

**Assignment**

Due: **1 June 12:00noon**  
Weighting: **20%**

Assignment has to be submitted via both on iLearn and ACST860 Assignment Box in BESS.

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 disruption of studies is made and approved. No submission will be accepted after solutions have been posted.

This Assessment Task relates to the following Learning Outcomes:
• Describe, develop, apply and analyse methods used to model cashflows contingent upon competing risks; construct and use multiple decrement service tables, and demonstrate understanding of the relationship with associated single decrement tables.

• Describe, apply and analyse the technique of discounted emerging costs for use in pricing, reserving and assessing profitability, for superannuation funds and related multiple decrement tables, traditional life insurance contracts and unit linked policies.

• Describe and illustrate the principal forms of heterogeneity within a population and the ways in which selection can occur. Demonstrate the ability to identify key unit concepts and to integrate them to solve, create and analyse novel problems.

Final Examination

Due: University Examination Period
Weighting: 60%

The final examination will be a three-hour written exam with ten minutes reading time, held during the University Examination period.

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 be returned to the students at the end of the final examination. Non-programmable calculators with no text-retrieval capacity are allowed. Dictionaries are not permitted.

This Assessment Task relates to the following Learning Outcomes:

• Extend the techniques learned in ACST255/859 to permit the calculation and analysis of cashflows dependent upon the death or survival of either or both of two lives, and cashflows dependent upon a fixed term as well as age.

• Describe, develop, apply and analyse methods used to model cashflows contingent upon competing risks; construct and use multiple decrement service tables, and demonstrate understanding of the relationship with associated single decrement tables.

• Describe, apply and analyse the technique of discounted emerging costs for use in pricing, reserving and assessing profitability, for superannuation funds and related multiple decrement tables, traditional life insurance contracts and unit linked policies.

• Define, calculate and analyse the use of various single figure indices, explain the rationale behind the indices, and explain the advantages and disadvantages of the indices for summarising and comparing actual experience in different scenarios.

• Describe and illustrate the principal forms of heterogeneity within a population and the ways in which selection can occur. Demonstrate the ability to identify key unit concepts and to integrate them to solve, create and analyse novel problems.
Delivery and Resources

Classes
The timetables for classes can be found on the University website at: http://www.timetables.mq.edu.au. Tutorials will commence in week 2 of the session. All lecture classes for weeks 8, 9 and 10 will be held in the computer lab E4B104.

Required and recommended texts and / or materials
Optional text. Detailed lecture materials are provided and it is not envisaged that you will require a text.

Lecture handouts. Lecture handouts are available for downloading from the website in advance of lecture classes. Print these (at 100% size) and bring them to the relevant lecture. It is expected that you will have these notes in all lectures.

Tables. The Formulae and Tables for Actuarial Examinations book is not required for this unit, and will not be provided in the examination. Instead, you will be asked to generate your own set of tables, based on up-to-date UK mortality tables. There will be Tables Tasks exercises set in the early weeks of the unit that will give you details of how to construct the tables and provide results to spot check your answers. In addition to generating results for your future use, the aim of these tasks is to help you to revise relevant results from ACST255/859. It is important that you keep up-to-date with the Tables Tasks so that you can use your tables to answer questions throughout this unit.

Technology used and required
You will be required to use the teaching website, Excel and Word.

Unit webpage
Course material is available on the learning management system (iLearn). To access the teaching website, go to http://ilearn.mq.edu.au and login using your usual login and password.

Teaching and learning activities
Lectures. The unit material is covered in the three hours of lectures each week.

Tutorials. The tutorial is an opportunity for you to discuss the exercises available for each section of work with your tutor. The tutorials will cover the lecture material from the same week, and tutorials commence in week 2.

Computer lab classes. These will replace all of the lecture classes in weeks 8, 9 and 10.

Material to bring to classes. You are expected to bring to all classes the relevant lecture handout printout for the current and previous weeks, blank paper to complete exercises, a calculator, and your completed Tables Tasks.
# Unit Schedule

<table>
<thead>
<tr>
<th>Week Beginning</th>
<th>Lecture and tutorial (Monday)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27 Feb</td>
<td>Unit introduction and Section 1: Joint life and last survivor statuses</td>
</tr>
<tr>
<td>6 March</td>
<td>Section 2: Simple annuities and assurances involving two lives</td>
</tr>
<tr>
<td>13 March</td>
<td>Section 3: Contingent and reversionary benefits</td>
</tr>
<tr>
<td>20 March</td>
<td>Section 4: Competing risks</td>
</tr>
<tr>
<td>27 March</td>
<td>Section 5: Multiple decrement tables</td>
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<tr>
<td>3 April</td>
<td>Section 6: Superannuation funds</td>
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<tr>
<td>10 April</td>
<td>Class Test</td>
</tr>
<tr>
<td>17 April</td>
<td>MID-SEMESTER STUDY BREAK</td>
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<tr>
<td>24 April</td>
<td></td>
</tr>
<tr>
<td>1 May</td>
<td>Section 7: Profit testing - conventional business</td>
</tr>
<tr>
<td>8 May</td>
<td>Section 8: Profit testing - unit-linked business</td>
</tr>
<tr>
<td>15 May</td>
<td>Profit testing revision</td>
</tr>
<tr>
<td>22 May</td>
<td>Section 9: Mortality risk factors and selection</td>
</tr>
<tr>
<td>29 May</td>
<td>Section 10: Mortality indices</td>
</tr>
<tr>
<td>5 June</td>
<td>Revision and exam information</td>
</tr>
</tbody>
</table>
Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:


In addition, a number of other policies can be found in the Learning and Teaching Category of 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/support/student_conduct/](https://students.mq.edu.au/support/student_conduct/)

Results

Results shown in iLearn, 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.

Student Support

Macquarie University provides a range of support services for students. For details, visit [http://students.mq.edu.au/support/](http://students.mq.edu.au/support/)

Learning Skills

Learning Skills ([mq.edu.au/learningskills](http://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 Enquiry Service

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

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.

Supplementary Examinations
Further information regarding supplementary exams, including dates, is available here http://www.businessandeconomics.mq.edu.au/current_students/undergraduate/how_do_i/disruption_to_studies

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

• Extend the techniques learned in ACST255/859 to permit the calculation and analysis of cashflows dependent upon the death or survival of either or both of two lives, and cashflows dependent upon a fixed term as well as age.

• Describe, develop, apply and analyse methods used to model cashflows contingent upon competing risks; construct and use multiple decrement service tables, and demonstrate understanding of the relationship with associated single decrement tables.

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• Define, calculate and analyse the use of various single figure indices, explain the rationale behind the indices, and explain the advantages and disadvantages of the indices for summarising and comparing actual experience in different scenarios.
Assessment tasks

- Class Test
- Assignment
- Final Examination

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

- Extend the techniques learned in ACST255/859 to permit the calculation and analysis of cashflows dependent upon the death or survival of either or both of two lives, and cashflows dependent upon a fixed term as well as age.
- Describe, develop, apply and analyse methods used to model cashflows contingent upon competing risks; construct and use multiple decrement service tables, and demonstrate understanding of the relationship with associated single decrement tables.
- Describe, apply and analyse the technique of discounted emerging costs for use in pricing, reserving and assessing profitability, for superannuation funds and related multiple decrement tables, traditional life insurance contracts and unit linked policies.
- Describe and illustrate the principal forms of heterogeneity within a population and the ways in which selection can occur. Demonstrate the ability to identify key unit concepts and to integrate them to solve, create and analyse novel problems.

Assessment tasks

- Class Test
- Assignment
- Final Examination

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

- Describe, apply and analyse the technique of discounted emerging costs for use in pricing, reserving and assessing profitability, for superannuation funds and related multiple decrement tables, traditional life insurance contracts and unit linked policies.
- Describe and illustrate the principal forms of heterogeneity within a population and the ways in which selection can occur. Demonstrate the ability to identify key unit concepts and to integrate them to solve, create and analyse novel problems.

Assessment tasks

- Class Test
- Assignment
- Final Examination

Changes from Previous Offering

There have been minor changes to the lecture and tutorial materials. The assessment changes each year.

Research and Practice

This unit uses research by Macquarie University researchers, as well as from other Australian and international researchers (references are given in the unit notes).

You are also required to source and use Australian and international research as part of the assignment in this unit.