Students in this unit should read this unit guide carefully at the start of semester. It contains important information about the unit. If anything in it is unclear, please consult the unit convenor.

ABOUT THIS UNIT

Unit description

The unit covers:

- 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.

Professional exemptions

Students gaining a grade of credit or higher in both ACST859 Contingent Payments 1 and this unit may apply for exemption from subject CT5 of the professional exams of the Actuaries Institute.

TEACHING STAFF

Leonie Tickle is the unit convenor and will be taking the lecture and tutorial classes.

CONTACTING STAFF

Leonie Tickle’s consultation hour is Tuesday 10-11 am each teaching week of the semester, in her office E4A608. She can also be contacted through the unit website. In special circumstances, an appointment may be made outside regular consultation hours. Staff will not conduct consultations by email. You may, however, phone staff during their consultation hours.

Students experiencing significant difficulties with any topic in the unit must seek assistance immediately.

CLASSES

The timetable for classes can be found on the University web site at: http://www.timetables.mq.edu.au/.
This unit consists of a 3 hour lecture Friday 9-12 in room W5C334, and a 2 hour tutorial Friday 3-5 in room C4A325. Tutorials commence in week 1 of the semester. All lecture and tutorial classes in weeks 10, 11 and 12 will be held in the computer lab room E4B308.

Any alterations to classes will be advised in lectures and / or via the website.

**REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS**

**Optional text**

The ActEd CT5 notes are an optional text. Those who completed ACST859 in 2011 may already have these notes. If you decide to use these notes, it is recommended that you read the optional readings from the ActEd notes in advance of the lecture. During the lecture you can then work through the lecture handout, which will cover similar ground as the ActEd notes but expressed in a different way.

Those who want to view a copy of the ActEd CT5 notes should contact the unit convenor. Arrangements may be made for you to view them in the Actuarial Studies Department. The notes are not available in the library. **This reference copy of the notes cannot under any circumstances be photocopied.**

**Lecture notes**

Lecture Handouts (ie. notes with gaps) are available for downloading from the unit website. **Print these in advance (at 100% size) and bring them to the relevant lecture to complete. It is expected that you will have the notes in lectures.**

Complete notes including solutions to lecture exercises will be made available for downloading from the unit website at the end of the week in which the work is completed. **Complete notes cannot be made available any earlier for individual students unless the formal grounds for Special Consideration or Equity Support are met.**

**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 various weeks 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 ACST859. **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 WEB PAGE**

Course material is available on the learning management system (iLearn). Details will be provided in classes.
LEARNING OUTCOMES

The learning outcomes of this unit are as follows. Specific learning objectives are given in the lecture notes at the start of each section of work. You should review these in advance of each lecture and after completing each section of work.

1. 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.

2. Define, describe and illustrate the principal forms of heterogeneity within a population and the ways in which selection can occur.

3. Extend the techniques learned in ACST859 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.

4. Describe, develop, apply and analyse methods used to model cashflows contingent upon competing risks.

5. Construct and use multiple decrement service tables, and demonstrate understanding of the relationship with associated single decrement tables.

6. 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.

GRADUATE CAPABILITIES

In addition to the discipline-based learning objectives, all academic programs at Macquarie seek to develop the capabilities the University's graduates will need to develop to address the challenges, and to be effective, engaged participants in their world.

This unit contributes to this by developing the following graduate capabilities:

1. Discipline Specific Knowledge and Skills:
   (a) Have an appreciation of the time value of money.
   (b) Be an expert in compound interest theory, in both discrete and continuous scenarios.
   (c) Have a deep intuitive understanding of the meaning of probability and the methods of manipulating probabilities.
   (d) Understand the use of Expected Present Value as a key concept in many actuarial applications.
   (e) Have skills in fitting and assessing the reliability of statistical models, particularly in the context of financial applications.
   (f) Have the ability to develop methods for measuring and manipulating the range of decrement rates relevant to actuarial practice.

2. Critical, Analytical and Integrative Thinking

3. Problem Solving and Research Capability

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 attempt the section exercises given in the lecture notes at the end of each section, and to discuss problems with the tutor. Additional tutorial questions will be made available to students attending the tutorial – these questions will not be made available on the website or in hardcopy, or to students not attending the tutorial.

**Computer lab sessions** will replace all lecture and tutorial classes in weeks 10, 11 and 12. These classes will be held in room E4B308.

**Material to bring to classes**

You are expected to bring to all classes:
- the relevant pages of the Lecture Handouts – Complete Set, to complete during classes; and (for tutorials) a copy of the section exercises from Lecture Handouts – Complete Set;
- completed Lecture Handouts for previous sections of work;
- blank paper, to complete exercises;
- a calculator;
- your completed Tables Tasks, so that you can refer to tables when completing exercises.

**Schedule of Classes and Assessments**

A schedule of classes and assessments is given on the final page of this outline. This may be adapted as the semester proceeds. Any alterations to classes or assessment due dates will be advised in lectures and/or via the website.

**RELATIONSHIP BETWEEN ASSESSMENT AND LEARNING OUTCOMES**

This unit is assessed using a class test, regular short quizzes, a series of assignments and a final examination. (You will also be provided with non-assessable short questions to attempt during the tutorial, as well as section exercises to attempt during the tutorial and in your own time.) The assessment structure is suitable given the problem-solving and technical nature of the unit, and is also aimed at encouraging you to regularly review the material. An assessment schedule is given on the previous page and any changes to the assessment or assessment due dates will be advised in classes.

The quiz questions and short tutorial questions (and to some extent, the assignment questions) are aimed at helping you to understand the fundamental concepts, before moving on to more difficult material. **They are not necessarily indicative of the difficulty of questions you could expect in the class tests and on the final exam** (ie. they are mostly easier, to assist your initial learning).

**Quizzes and Assignments**

The nine quizzes are worth a total 8% of the final assessment for the unit. Each quiz is based on the material in one section of the unit (Quiz 1 is based on material in Section 1, Quiz 2 is based on material in Section 2, … Quiz 9 is based on material in Section 9) but may also use some earlier work.

The four assignments are worth a total of 12% of the final assessment for the unit.

Quizzes and assignments are to be submitted online by the due dates shown on the schedule. You should not leave the submission of quizzes or assignments to the last minute in case there are system problems that cause delays. (In the rare case of prolonged University-wide technology problems, allowances will be made for all students). Feedback on each quiz and assignment will be available online once the assessment has been submitted and the deadline for the assessment has passed.
You must submit a quiz / assignment, in order to be able to access the questions and solutions throughout the semester. **Quizzes and assignments cannot subsequently be made available to students who do not submit an attempt** so please do not request this.

Quizzes 1 and 2 are used as early diagnostic tools to assess how well you are understanding the unit material and whether you need to revise pre-requisite material or to reconsider your enrolment in the unit. If you score less than 60% in these assessment tasks you should contact the unit convenor to discuss your options.

**Class test**

The test is worth 10% of the final assessment for the unit. It is scheduled for Friday 4 May at 9 am. and will cover Sections 1 to 6 inclusive. It will be a 75 minute written paper. The class test date, time, format and coverage may be subject to change – any changes will be advised in lectures and / or on the unit website.

Marked test papers including individual feedback will be returned to BESS. Class level results, marking guide and feedback on common errors will be provided on the website. **It is intended that marked papers and feedback will be returned within 12 working days** of the class test date.

**Exam**

A final examination is included as an assessment task for this unit to provide assurance that:

i) the product belongs to the student and
ii) the student has attained the knowledge and skills tested in the exam.

The final examination is worth 70% of the final assessment for the unit. It will be a three-hour written paper with ten minutes reading time held during the University Examination period. The University Examination period in First Half Year 2012 is from 11-29 June.

You are expected to present yourself for examination at the time and place designated in the University Examination Timetable. The timetable will be available in Draft form approximately eight weeks before the commencement of the examinations and in Final form approximately four weeks before the commencement of the examinations, from [http://exams.mq.edu.au/](http://exams.mq.edu.au/)

The only exception to not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these circumstances you may wish to consider applying for Special Consideration. The University’s policy on special consideration process is available at [http://www.mq.edu.au/policy/docs/special_consideration/policy.html](http://www.mq.edu.au/policy/docs/special_consideration/policy.html)

If a Supplementary Examination is granted as a result of the Special Consideration process the examination will be scheduled after the conclusion of the official examination period. Students applying for Special Consideration must make themselves available to sit a supplementary exam during this period.

The Macquarie university examination policy details the principles and conduct of examinations at the University. The policy is available at: [http://www.mq.edu.au/policy/docs/examination/policy.htm](http://www.mq.edu.au/policy/docs/examination/policy.htm)

You are advised that it is Macquarie University policy not to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, that is, the final day of the official examination period.
<table>
<thead>
<tr>
<th></th>
<th>Class test</th>
<th>Assignment</th>
<th>Quiz</th>
<th>Final examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title / name</td>
<td>Class test</td>
<td>Assignments 1 – 4</td>
<td>Quizzes 1 – 9</td>
<td>Final examination</td>
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<tr>
<td>Description</td>
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<td>Online questions</td>
<td>Formal invigilated exam</td>
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<td>Due date</td>
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<td>See schedule</td>
<td>See schedule</td>
<td>Exam period</td>
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<td>% Weighting</td>
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<td>12% in total</td>
<td>8% in total</td>
<td>70%</td>
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<td>Mark provided. Marking system is given in assignments.</td>
<td>Mark provided. Marking system is given in quizzes.</td>
<td>Mark provided. Marking system is given on exam paper.</td>
</tr>
<tr>
<td>Submission method</td>
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<td>Online</td>
<td>Online</td>
<td>Formal exam</td>
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<tr>
<td>Feedback</td>
<td>Class-level and individual, within 12 working days of submission</td>
<td>Online, within 1 day of the deadline for submission</td>
<td>Online, within 1 day of the deadline for submission</td>
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<tr>
<td>Estimated student workload (hours)</td>
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<td>35 (preparation)</td>
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</tbody>
</table>

Late submission of quizzes and assignments and rescheduling of class tests is not permitted. If illness or unavoidable disruption affects your ability to submit an assessment task or sit the test, you should contact the unit convenor immediately. Allowances will be made where a formal application for Special Consideration is approved.
RULES REGARDING TESTS AND EXAMINATIONS

You should ensure that your handwriting in the class tests and in the final examination is legible. Sections of work that are not legible will not be marked. For true/false questions, answers that are not clearly legible as either T or F will be assumed to be wrong and marked accordingly.

You are permitted to bring to the class test and the final examination, ONE A4 sheet of paper containing reference material printed on both sides. The sheet may be handwritten, typed or photo-reduced. Any mortality or statistical tables that you require will be provided for you in the class tests and the final examination.

Calculators will be allowed in the class tests and the final examination but a clear indication of the steps involved in every calculation must be shown. Any machines that have a text-retrieval capacity, whether or not they have a full alphabet on the keyboard, are not allowed. Calculators may be checked at the commencement of the class tests and final exam, and the make/model may be recorded.

Dictionaries will not be permitted in the class tests or the final examination.

Academic Senate has resolved that mobile phones should not be used in classrooms or be brought into examination rooms. Communication devices, including but not restricted to mobile phones, text message receivers, pagers and wireless-equipped calculators, may not be brought into the class tests or exam. If a student is found to have brought such a device into the examination room, the argument that the device was turned off will NOT be regarded as an acceptable excuse.

RESEARCH AND PRACTICE

- This unit uses research by Macquarie University researchers (references are given in the unit notes)
- This unit uses research from external sources (references are given in the unit notes)
- This unit gives you practice in applying research findings in your assignments
- This unit gives you opportunities to conduct your own research

ACADEMIC HONESTY

The nature of scholarly endeavour, dependent as it is on the work of others, binds all members of the University community to abide by the principles of academic honesty. Its fundamental principle is that all staff and students act with integrity in the creation, development, application and use of ideas and information. This means that:

- all academic work claimed as original is the work of the author making the claim
- all academic collaborations are acknowledged
- academic work is not falsified in any way
- when the ideas of others are used, these ideas are acknowledged appropriately.

Further information on the academic honesty can be found in the Macquarie University Academic Honesty Policy at http://www.mq.edu.au/policy/docs/academic_honesty/policy.html
GRADES

Macquarie University uses the following grades in coursework units of study:

HD - High Distinction
D - Distinction
CR - Credit
P - Pass
F - Fail

Grade descriptors and other information concerning grading are contained in the Macquarie University Grading Policy which is available at:

GRADING APPEALS AND FINAL EXAMINATION SCRIPT VIEWING

If, at the conclusion of the unit, you have performed below expectations, and are considering lodging an appeal of grade and/or viewing your final exam script please refer to the following website which provides information about these processes and the cut off dates in the first instance. Please read the instructions provided concerning what constitutes a valid grounds for appeal before appealing your grade.

http://www.businessandeconomics.mq.edu.au/new_and_current_students/undergraduate_current_students/how_do_i/grade_appeals

SPECIAL CONSIDERATION

The University is committed to equity and fairness in all aspects of its learning and teaching. In stating this commitment, the University recognises that there may be circumstances where a student is prevented by unavoidable disruption from performing in accordance with their ability. A special consideration policy exists to support students who experience serious and unavoidable disruption such that they do not reach their usual demonstrated performance level. The policy is available at:

http://www.mq.edu.au/policy/docs/special_consideration/policy.html

STUDENT SUPPORT SERVICES

Macquarie University provides a range of Academic Support Services. Details of these and other services for students can be accessed at http://www.student.mq.edu.au.

BESS. The Business and Economics Student Centre (BESS) is located in room E4B106. Information about facilities and services is at http://businessandeconomics.mq.edu.au/for/new_and_current_students/undergraduate/bess.

ACSTINFO. The ACSTINFO site is used to distribute information to all students majoring in actuarial studies. The information supplied may include administrative information and job advertisements. You will retain access to this site during the vacation following the end of this semester. It is to your advantage to ensure you read information on this web site regularly - you should not assume that information posted there will also be repeated in lectures. Access the site through iLearn.
IT CONDITIONS OF USE

Access to all student computing facilities within the Faculty of Business and Economics is restricted to authorised coursework for approved units. Student ID cards must be displayed in the locations provided at all times.

Students are expected to act responsibly when using University IT facilities. The following regulations apply to the use of computing facilities and online services:

- Accessing inappropriate web sites or downloading inappropriate material is not permitted. Material that is not related to coursework for approved units is deemed inappropriate.
- Downloading copyright material without permission from the copyright owner is illegal, and strictly prohibited. Students detected undertaking such activities will face disciplinary action, which may result in criminal proceedings.

Non-compliance with these conditions may result in disciplinary action without further notice.

Students must use their Macquarie University email addresses to communicate with staff as it is University policy that the University issued email account is used for official University communication.

CLASS ETIQUETTE

Mobile phones should be switched off during all lectures and tutorials. If there is a reason for you to keep your phone on you should request to be allowed to do so before the start of the class.

Lectures commence at 5 minutes past the hour and you are expected to be punctual.

You are expected to keep talking to a minimum during classes so as not to disrupt your fellow students (and the lecturer!).

FEEDBACK

I would welcome your feedback on any aspect of the unit. If you see that something could be improved, please let me know. You can give me feedback in lectures or by posting to the website (anonymously if need be).

I have made significant changes to the unit in recent years in response to feedback, including changing the format of tutorials, introducing mock tests, introducing videoed lecture, and introducing quizzes.

Leonie Tickle
20 February 2012
<table>
<thead>
<tr>
<th>Week</th>
<th>Week Beginning</th>
<th>Due Wednesday 11.50 pm</th>
<th>Friday 9-12 class</th>
<th>Friday 3-5 tutorial</th>
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<tr>
<td>1</td>
<td>27 Feb</td>
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<td>Lecture: Section 1 <em>Mortality indices</em> and <em>Gapminder</em></td>
<td>Tutorial: Section 1</td>
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<tr>
<td>2</td>
<td>5 Mar</td>
<td>Quiz 1</td>
<td>Lecture: Section 2 <em>Mortality risk factors and selection</em> and <em>Historical mortality</em></td>
<td>Tutorial: Section 2</td>
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<tr>
<td>3</td>
<td>12 Mar</td>
<td>Quiz 2</td>
<td>Lecture: Section 3 <em>Simple annuities and assurances involving two lives</em></td>
<td>Tutorial: Section 3</td>
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<tr>
<td>4</td>
<td>19 Mar</td>
<td>Quiz 3</td>
<td>Lecture: Section 4 <em>Contingent and reversionary benefits</em></td>
<td>Tutorial: Section 4</td>
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<tr>
<td>5</td>
<td>26 Mar</td>
<td>Quiz 4; Assignment 1</td>
<td>Lecture: Section 5 <em>Competing risks</em></td>
<td>Tutorial: Section 5</td>
</tr>
<tr>
<td>6</td>
<td>2 Apr</td>
<td>Quiz 5</td>
<td>Lecture: Section 6 <em>Multiple decrement tables</em></td>
<td>Tutorial: Section 6</td>
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<td><strong>STUDY BREAK</strong></td>
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<tr>
<td><strong>BREAK</strong></td>
<td><strong>16 April</strong></td>
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<td>7</td>
<td>23 Apr</td>
<td>-</td>
<td>Lecture: Section 6 (continued) and Revision of Sections 1 to 6</td>
<td>Mock test</td>
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<td>8</td>
<td>30 Apr</td>
<td>Quiz 6</td>
<td>Test</td>
<td>To be advised</td>
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<tr>
<td>9</td>
<td>7 May</td>
<td>Assignment 3</td>
<td>Lecture: Section 7 <em>Superannuation Funds</em></td>
<td>Tutorial: Section 7</td>
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<tr>
<td>10</td>
<td>14 May</td>
<td>Quiz 7</td>
<td>Lab class: Section 8 <em>Profit testing</em> (E4B 308)</td>
<td>Lab class: Section 8 (continued) (E4B 308)</td>
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<tr>
<td>11</td>
<td>21 May</td>
<td>Quiz 8</td>
<td>Lab class: Section 9 <em>Determining provisions using profit testing</em> (E4B 308)</td>
<td>Lab class: Section 9 (continued) (E4B 308)</td>
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<tr>
<td>12</td>
<td>28 May</td>
<td>Quiz 9</td>
<td>Lab class: Section 10 <em>Profit Testing – Additional Exercises</em> (E4B308)</td>
<td>Lab class: Section 10 (continued) (E4B 308)</td>
</tr>
<tr>
<td>13</td>
<td>4 June</td>
<td>Assignment 4</td>
<td>Unit surveys, Exam information, Revision</td>
<td>Revision</td>
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</tbody>
</table>