Year and Semester: 2012 Semester 1

Unit convenor: Professor Piet de Jong

[Prerequisites / Corequisites:] ACST 851(P); Stats 810 (P) or equivalent

Credit points: 4

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 one of the teaching staff in the unit.

ABOUT THIS UNIT

☐ Unit description. This unit covers the analysis of cash flows dependent on (“contingent upon”) the life or death of a “life” (i.e., single individual). Single decrement survival models are used to evaluate the expected present values of payments under life insurance and annuity contracts, and calculate the premiums of such contracts. The concepts of pricing and reserving for future contingent liabilities are considered, and the methods of calculating required reserves are discussed.

☐ Unit rationale. This unit is a core unit of the degree program for actuarial studies. It covers a substantial part of the materials in the UK Institute of Actuaries (IA) syllabus for Subject CT5. It is a prerequisite to units ACST355/860 Contingent Payments 2 and ACST358/818 Survival Models.

TEACHING STAFF

☐ Convenor Professor Piet de Jong, Room E4A 610, piet.dejong@mq.edu.au

CONTACTING STAFF

• Consultation times: Mondays 2-4pm during teaching weeks

You are encouraged to seek help at a time that is convenient to you from a staff member teaching on this unit during their regular consultation hours. 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.

In order to gain access to staff located at levels 1, 2 and 3 of building E4A during their consultation hours please ring the staff member from the phones available in the
lobby (phone numbers of relevant staff members will be provided on Blackboard and are available next to the phones).

- Other ways of contacting staff: Please use email

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

**CLASSES**

- Lectures are held on Mondays 8:00am to 11:00am **E7B 263** (Lectures are NOT recorded using i-lecture)
- Tutorials are held on Tuesdays from 11:00am to 1:00pm **W6B 345**
- Tutorials start in Week 2.

**PRIZES**

- Prizes for this unit
  

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

- The primary texts for the unit are the Lecture Notes provided by the Lecturer.
- Lecture Notes will be posted on the website before the lectures.
- The main additional reading materials are the ActEd CT5 Notes (2011 or later edition).
- Classic references are: “Life Contingencies” by A. Neill and a similarly titled book by C.W Jordan
- Reading of the ActEd CT5 Notes (Chapters 1 – 7) will considerably enhance the benefits you can gain from the lectures.
- The ActEd notes can be purchased through ASSOC. More information about ASSOC can be found at its website [http://www.mqassoc.org](http://www.mqassoc.org)

**TECHNOLOGY USED AND REQUIRED**

- You will need access to the internet to obtain course information and download teaching materials.
- For some exercises it may be useful to use a spreadsheet program.

**UNIT WEB PAGE**

- Course material is available on the learning management system (iLearn)

**LEARNING OUTCOMES**

The learning outcomes of this unit are:
1. Understand simple survival models and related properties
2. Master the skills to calculate the expected present values and the variances of benefits in standard life assurance and annuity contracts
3. Understand the concepts of select and ultimate mortalities and their applications
4. Familiar with the calculations of net premiums and reserves under various life insurance contracts
5. Able to calculate prospective and retrospective policy values under variable benefits and with-profit life insurance policies
6. Understand the costs and profits of life insurance business and be able to calculate gross premiums and reserves

**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) An appreciation of the time value of money and the effect of compound interest
   • (b) Expertise in calculating and applying Expected Present Value
   • (c) A deep understanding of life insurance products and the concepts of reserves
   • (d) Ability to connect probability theory with actuarial applications to solve practical problems arising from life insurance and related industries
2. **Critical, Analytical and Integrative Thinking**
3. **Problem Solving and Research Capability**
4. **Creative and Innovative**
5. **Effective Communication**
6. **Engaged and Ethical Local and Global citizens**
7. **Socially and Environmentally Active and Responsible**
8. **Capable of Professional and Personal Judgement and Initiative**
9. **Commitment to Continuous Learning**

**LEARNING AND TEACHING ACTIVITIES**

- The unit is taught through 3 hours of lectures and 2 hours of tutorial per week. Lectures cover the topics and materials in accordance with the syllabus of Subject CT5 of Institute of Actuaries (IA). Tutorials will discuss exercise questions covered by the lectures.
- Students are expected to listen carefully to all lectures and tutorials; participate in discussions during tutorials, read relevant materials in advance; review the knowledge learnt in classes; and complete all assignments independently.
- The planned week-by-week list of the topics is as follows: Note: This is the broad schedule, and small departures are expected on the basis of week to week progress.
Week
1. Introduction to survival models
2. Life assurance contracts
3. Life annuity contracts
4. The Life table; Select mortality
5. Evaluation of life insurance contracts
6. Net premiums and reserves; Quiz

Easter 2 Week Break
7. Class/Mid term test
8. Policies with variable benefits
9. With-profit policies
10. Expenses of life insurance; Gross Premiums
11. Gross premiums and reserves
12. Profit and loss in life insurance
13. Revision

Research and Practice

- This unit uses research from external sources
  - Research underlying the topic of “life contingencies” goes back to original attempts to construct life tables (see Gaunt J (1646): Natural and Political Observations made upon the Bills of Mortality)

- This unit gives you practice in applying research findings in your assignments
  - You will be asked to price life insurance contracts particular to your “life”
<table>
<thead>
<tr>
<th>Assessment</th>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3</th>
<th>Task 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title/Name</td>
<td>Assignment 1</td>
<td>Class Test</td>
<td>Assignment 2</td>
<td>Final Examination</td>
</tr>
<tr>
<td>Description</td>
<td>An individual assignment specific to each student</td>
<td>2 hours plus 10 minute reading with detailed questions</td>
<td>An individual assignment specific to each student</td>
<td>3 hours plus 10 minute reading including multiple choice and detailed questions</td>
</tr>
<tr>
<td>Date</td>
<td>23 March</td>
<td>23 April</td>
<td>June 8</td>
<td>To be announced</td>
</tr>
<tr>
<td>Weighting</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>70%</td>
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<tr>
<td>Grading method</td>
<td>Based on level of understanding and problem solving skills; full solutions are expected for detailed questions</td>
<td>Based on level of understanding and problem solving skills; full solutions are expected for detailed questions</td>
<td>Based on level of understanding and problem solving skills; full solutions are expected for detailed questions</td>
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<tr>
<td>Feedback</td>
<td>Marked script</td>
<td>None as per university policy</td>
<td>None as per university policy</td>
<td>None as per university policy</td>
</tr>
<tr>
<td>Estimated workload</td>
<td>4 hours</td>
<td>5-10 hours</td>
<td>4 hours</td>
<td>15-20 hours</td>
</tr>
<tr>
<td>Learning outcomes assessed</td>
<td>1-4</td>
<td>1-4</td>
<td>1-4</td>
<td>1-6</td>
</tr>
<tr>
<td>Graduate capabilities assessed</td>
<td>1(a)-1(d)</td>
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<td>1(a)-1(d)</td>
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</tr>
</tbody>
</table>
• **Assignments**: There will be two assignments for this unit. They are assessed, but solutions will be provided. You are expected to complete assignments independently.

• **Attendance** of lectures and tutorials is essential to the success of studying this unit, although it will not be recorded.

• **Examinations** 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.

A 3 hour final examination (plus 10 minute reading) for this unit will be held during the University Examination period.

The University Examination period in First Half Year 2012 is from 12 June to 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. [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. (Individual Faculties may wish to signal when the Faculties’ Supplementary Exams are normally scheduled.)

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)

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**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: http://www.mq.edu.au/policy/docs/grading/policy.html

**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.
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.