ACTL40002  Risk Theory I

ACTL90004  Insurance Risk Models

SUBJECT GUIDE

Semester 1, 2015

Prepared by
Professor David Dickson

Centre for Actuarial Studies
Department of Economics
Faculty of Business and Economics
Subject Outline

Subject Aims

The major aim of this subject is to study the modelling of the aggregate claims from an insurance portfolio in a fixed time period. We will focus on two models: the collective risk model and the individual risk model. We also will study Bayesian statistics, credibility theory and there will be an introduction to ruin theory. The completion of this subject and ACTL30004 Actuarial Statistics/ACTL90008 Statistical Techniques in Insurance (for Honours/Masters students respectively) with a good performance in all exams will lead to exemption from professional exam CT6.

Textbook

*Insurance Risk and Ruin*, by Dickson, Chapters 1, 4, 5, 6, 7, 9. (The material in other chapters is covered in the Honours subject Risk Theory II/Masters subject Insurance Risk Models II.)

Learning Outcomes

Subject Objectives

To view the subject objectives and the generic skills you will develop through successful completion of this subject, see the University Handbook:


To view the learning goals, generic skills and graduate attributes for your degree, please locate the University Handbook entry for your degree at http://handbook.unimelb.edu.au/

Generic Skills

In this subject you will have the opportunity to develop important generic skills. These include: written communication, problem solving, probabilistic reasoning, recursive techniques, moment generating function techniques, mathematical proofs and derivations, Bayesian statistics and experience rating.

Prerequisites

- ACTL30004 Actuarial Statistics for ACTL40002
- MAST20004 Probability (or equivalent) for ACTL90004
Subject Contents

- Loss distributions in non-life insurance: counting and claim amount distributions; effects of simple reinsurance arrangements; convolutions; parameter estimation.

- The collective risk model: moments and m.g.f. of aggregate claims; the effect of reinsurance; recursive techniques; approximation methods; parameter variability.

- The individual risk model: moments of aggregate claims; recursive calculation; compound Poisson approximation.

- Introduction to ruin theory: Lundberg’s inequality and the adjustment coefficient.

- Credibility theory: exact (Bayesian) credibility; Buhlmann-Straub models.

Academic Staff Contact Details

Lecturer Contact Details

Your coordinator is Associate Professor Shuanming Li, who will teach in the second half of semester.

Email: shli@unimelb.edu.au

Room: 319, Level 3, FBE Building, 111 Barry Street

Your lecturer in the first half of semester is Professor David Dickson.

Email: dcmd@unimelb.edu.au

Room: 324, Level 3, FBE Building, 111 Barry Street

Consultation hours will be notified via the LMS.

Email Protocol

Please note that we are only able to respond to student emails coming from a University email address. Please do not use personal email addresses such as Yahoo, Hotmail or even business email addresses. Emails from non-University email addresses may be filtered by the University’s spam filter, which means that we may not receive your email. All correspondence relating to this subject will only be sent to your University email address. Note that you must first activate your University email address before you can send or receive emails at that address. You can activate your email account at this link: http://accounts.unimelb.edu.au/.

While academic staff endeavor to address queries received via email, it is more appropriate to resolve substantive questions during lectures and tutorials and during
normal consultation hours. With this in mind, we encourage students to attend all lectures and tutorials and to familiarize themselves with the consultation hours offered by the lecturers in this subject.

Lectures and Tutorials

Lecture Times

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>9:00-10:00</td>
<td>Theatre 3, FBE Building</td>
</tr>
<tr>
<td>Wednesday</td>
<td>9:00-10:00</td>
<td>Theatre 2, Old Geology</td>
</tr>
<tr>
<td>Thursday</td>
<td>9:00-10:00</td>
<td>Theatre 3, FBE Building</td>
</tr>
</tbody>
</table>

Lecture Participation Requirements

Lecture attendance is very important and good class behaviour is expected. Mobile phones should be switched OFF (not silent, but OFF).

Lecture Slides

Lecture slides will be available on the LMS. Some slides will be incomplete and students are expected to take notes in lectures.

Tutorials

There are no weekly tutorials for this subject. Tutorials will take place on completion of a topic. There will be about 6 tutorials in the whole semester and the question sheets will be posted on the LMS. The solutions will be posted to LMS after each tutorial.

There will be weekly problem sheets on the LMS. These will not be discussed in class, but solutions will be posted with a two week time lag.
Assessment

Assessment Overview

The assessment for ACTL40002 comprises the following:

<table>
<thead>
<tr>
<th>Assessment Task</th>
<th>Individual or Group</th>
<th>Due</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid-semester exam</td>
<td>Individual</td>
<td>Week 7</td>
<td>20%</td>
</tr>
<tr>
<td>End-of-semester exam</td>
<td>Individual</td>
<td>Assessment period</td>
<td>80%</td>
</tr>
</tbody>
</table>

The assessment for ACTL90004 comprises the following:

<table>
<thead>
<tr>
<th>Assessment Task</th>
<th>Individual or Group</th>
<th>Due</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written Assignment</td>
<td>Individual</td>
<td>Week 12</td>
<td>10%</td>
</tr>
<tr>
<td>Mid-semester exam</td>
<td>Individual</td>
<td>Week 7</td>
<td>20%</td>
</tr>
<tr>
<td>End-of-semester exam</td>
<td>Individual</td>
<td>Assessment period</td>
<td>70%</td>
</tr>
</tbody>
</table>

- The mid-semester exam will take place on the Monday of Week 7, i.e. on 20 April. It is 50 minutes long. A specimen exam paper will be posted on the LMS in Week 6.

- A 2-hour final exam will be given during the end of semester exam period. A specimen exam paper with solutions will be posted on the LMS.

Exam Policy

The Faculty requires that you are available for the entire examination period. Supplementary exams will not be provided in cases of absence during the examination period, unless the absence is due to serious illness or other serious circumstances.

The examination period for this semester is 9-26 June.
Special Consideration

- Students apply for Special Consideration through My Unimelb via the Apply for Special Consideration link under Exams and Assessment in the Admin tab.

- You must submit your online application no later than 3 working days after the due date for submission or examination of the particular component of assessment, to which your application refers.

Other Subject Resources

Past Exams

No past end-of-semester exams will be provided, but some tutorial sheets will contain past end-of-semester exam questions.

Subject Prize

Tillinghast-Towers Perrin has sponsored a prize of $500 for the best overall performance by an honours student in ACTL40002 and ACTL40003.
Other Information

• The statistical package R will be used.

• You may also find it useful to learn how to use the Mathematica package.

• To login in to LMS, go to the web site here: http://www.lms.unimelb.edu.au/. Click on the Access the LMS button located on the right-hand side of the screen. Type in your unimelb email account username and password into the spaces provided. If you have not accessed your university email account before, note that you must activate your email account before you can log into the LMS (or access your email for that matter). Click Login.

• You are expected to complete problem sheets on a weekly basis and to attempt tutorial problems before tutorial classes.

• You must adhere to the Centre’s calculator policy for exams (which is the same as that for professional actuarial exams). Specifically, you may use only one of the following calculators:
  - Casio FX82 (with or without any suffix)
  - Casio FX83 (with or without any suffix)
  - Casio FX85 (with or without any suffix)
  - Sharp EL531 (with or without any suffix)
  - Texas Instruments BA II Plus (with or without any suffix)
  - Texas Instruments TI-30 (with or without any suffix)