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([map GH32](#), [reference G3](#))

Course Outline

STAT3037/6043 Life Contingencies

Semester 1, 2012

*STUDENTS: Course details change from semester to semester. **Please check** that you are reading the Course Outline for the correct semester.*

Course Description

The aim of this course is to provide grounding in the mathematical techniques which can be used to model and value cashflows dependent on death, survival or other uncertain risks. Topics covered include: principal forms of heterogeneity within a population and the ways in which selection can occur; definition of simple assurance and annuity contracts; development of formulae for the means and variances of the present values of the payments under these contracts, assuming deterministic interest; practical methods of evaluating expected values and variances of simple insurance and annuity contracts; description and calculation, using ultimate or select mortality, of net premiums and net premium provisions for simple insurance contracts; and the calculation of gross premiums and provisions of assurance and annuity contracts.

It builds upon principles and techniques introduced in Financial Mathematics (STAT2032), in particular annuities and discounted cash flow techniques, and in Survival Models (STAT3032), in particular mortality tables and probabilities.

Graduate Studies Select Classification

Advanced.

Contacts

Role	Office address (all in CBE Building 26C)	Email	Telephone
<i>Course Convenor and lecturer</i> Aaron Bruhn	Room 4.45	aaron.bruhn@anu.edu.au	6125-4904
<i>School Student Administrator</i> Tracy Skinner	Room 4.50	Tracy.skinner@anu.edu.au	6125-0487

Communication

Email

If necessary, the lecturers and tutors for this course will contact students on their official ANU student email address. Information about your enrolment and fees from the Registrar and Student Services' office will also be sent to this email address.

Announcements

Students are expected to check the Wattle site for announcements about this course, e.g. changes to timetables or notifications of cancellations. Notifications of emergency cancellations of lectures or tutorials will be posted on the door of the relevant room.

Course URLs

More information about this course may be found on:

- [Study @ ANU](#),
- the [College of Business and Economics website](#), and
- [Wattle](#), the University's online learning environment. Log on to Wattle using your student number and your ISIS password.

For STAT6043 students, please note the STAT6043 website will not be updated during the semester. You should visit the STAT3037 site.

Consultation hours

Consultation times with Aaron, as well as the tutors for this course, will be available on the Wattle course site from week 2 onwards.

Please feel free to email or contact Aaron to arrange any other time outside the stated consultation hours, if required.

Course Information

Learning Outcomes

To achieve an understanding of and facility in:

- Mortality and selection.
- Life assurance contracts and life annuity contracts.
- Evaluation of assurances and annuities.
- Reserves and policy values.
- Mortality profit and extra risk.
- Increasing insurances and with-profit policies.
- Increasing annuities and applications of reserves.
- Multiple life functions and insurances and annuities involving two or more lives.
- Contingent and reversionary benefits.

Study Schedule

The following topics will be covered in this course:

Week 1: Mortality and selection.

Week 2: Life assurance contracts.

Week 3: Life annuity contracts.

- Week 4:** Evaluation of assurances and annuities.
- Week 5:** Further issues in premium calculations and accumulations.
- Week 6:** Reserves and policy values.
- Week 7:** Policy values, mortality profit and extra risk.
- Week 8:** Increasing insurances and with-profit policies.
- Week 9:** Increasing annuities and applications of reserves.
- Week 10:** Multiple life functions.
- Week 11:** Insurances and annuities involving two or more lives.
- Week 12:** Contingent and reversionary benefits.
- Week 13:** Revision.

Workload

Students taking this course are expected to commit at least 10 hours a week to completing the work.

This will include:

- 3 hours a week in lectures;
- 1 hour per week in tutorials;
- 6 hours per week reading notes and working on problems presented in lectures, and preparing for tutorials.

Course Delivery

There will be three hours of lectures per week at the following times and location:

Monday	9.00 AM – 10:00 AM	COP T (Building 25)
Thursday	9:00 AM – 10:00 AM	MCC T3 (Building 26a)
Friday	11:00 AM – 12:00 Noon	MCC T3 (Building 26a)

Tutorials

Students will be expected to attend a one hour tutorial per week from the second week of semester. The tutorials in this unit serve two functions. Firstly, they provide students with the opportunity to seek assistance concerning lecture material. Secondly, practice problems will be assigned each week and the solutions will be discussed in the tutorials. Generally the questions will relate to the lecture material of the previous week. Students are expected to have attempted the questions prior to the tutorial. Solutions to the tutorial questions will also be placed on the course website.

If there is a particular question that you wish to discuss in the tutorial (that is not one of the questions assigned for the tutorial), then please inform your tutor in advance in order to allow them time to adequately prepare solutions.

Enrolment in tutorials will be completed online using the Electronic Teaching Assistant (ETA). To enrol, follow these instructions:

1. Go to <http://eta.fec.anu.edu.au>.

2. You will see the Student Login page. To log into the system, enter your University ID (your student number) and password (your ISIS password) in the appropriate fields and hit the **Login** button.
3. Read any news items or announcements.
4. Select "Sign Up!" from the left-hand navigation bar.
5. Select your courses from the list. To select multiple courses, hold down the control key. On PCs, this is the **Ctrl** key; on Macs, it is the **⌘** key. Hold this key down while selecting courses with the mouse. Once courses are selected, hit the **SUBMIT** button.
6. A confirmation of class enrolments will be displayed. In addition, an email confirmation of class enrolments will be sent to your student account.
7. For security purposes, please ensure that you click the **LOGOUT** link on the confirmation page, or close the browser window when you have finished your selections.
8. If you experience any difficulties, please contact the School Office (see page 1 for contact details).

Assessment

Assessment for the course consists of:

3 quizzes in class:	30% (best 2 quizzes count for 15% each)
Final examination:	70%

There will be three 40-minute quizzes during the semester. They will all be held in the lecture room during the relevant lecture time of the specified day. Details are as follows:

Quiz	Date	Course content covered
1	Friday 23 March	Material relating to lectures of weeks 1-3 & tutorials of weeks 2-4
2	Friday 27 April	Material relating to lectures of weeks 4-6 & tutorials of weeks 5-7
3	Friday 18 May	Material relating to lectures of weeks 7-9 & tutorials of weeks 8-10

Your best two quizzes in terms of raw mark obtained will each count for 15% of your final grade. That is, if you perform relatively poorly in one quiz compared to the other two, then your overall mark will still only consist of your top two quiz marks.

The final examination will be three hours long and will cover the entire syllabus. Specific details regarding examination conditions and the time and location for this examination will be provided once confirmed.

All quizzes and the final exam will be closed book, with the only permitted materials being a non-programmable calculator and *Formulae and Tables for Actuarial Examinations*. A formula sheet will be attached to each exam paper to assist students. Students may view the formula sheet in advance on the course website.

The following will be used to determine your final raw score:

$70\% \times \text{final examination score} + 30\% \times \text{average score of top 2 quizzes}$.

Example:

Aaron scores 45% in quiz 1, 75% in quiz 2, and forgets to turn up for quiz 3. He also scores 68% in the final exam. His overall raw score will be:

$$70\% \times 68\% + 30\% \times \left(\frac{45\% + 75\%}{2} \right) = 65.6\%.$$

Scaling

Your final mark for the course will be based on the **raw** marks allocated for each quiz or examination. However, your final mark may not be the same number as produced by that formula, as marks may be **scaled**. Any scaling applied will preserve the rank order of raw marks (i.e. if your raw mark exceeds that of another student, then your scaled mark will exceed the scaled mark of that student), and may be either up or down.

Exemption from Actuarial Professional examination

The Australian National University is accredited by the Actuaries Institute (IAAust) to provide students with exemptions from the Part I professional examinations of the Institute. Exemptions are recommended subject to obtaining sufficiently high grades in designated courses.

In conjunction with STAT3038 this course provides for an exemption from the IAAust professional examination CT5. The standard for exemption is a Credit average across the two courses (note that 59% in one course and 60% in another does not constitute an exemption) with a minimum of 50% P in each relevant subject. A grade of 50% PS which is achieved if a student sits and passes a supplementary exam is NOT sufficient.

Required Textbook and Supplementary Reading

It is essential for students to obtain a copy of the book *Formulae and Tables for Actuarial Examinations (2002)*. This book will be used as a reference in completing exercises throughout this course, and is a permitted material in both the mid-semester and final examinations. It can be purchased through the University bookshop or ordered directly through ACTED Australia (website: www.acted.com.au).

Selected chapters from the text *Life Assurance Mathematics* by W.F. Scott will be available on the course website, to act as supplementary reading to the lecture notes.

All basic course materials will be available on the course website. This material includes lecture notes and tutorial exercises.

University subscription to the Institute of Actuaries

The Institute of Actuaries of Australia (IAAust) allows students to become IAAust University Subscribers free of charge. Full time undergraduates studying at an Institute accredited university who are members of a university student actuarial society are eligible. To sign up, go to <http://www.actuaries.asn.au/Membership/MembershipoftheInstitute/Subscriber.aspx>

The University Subscriber offer is not a membership of the IAAust but a subscription to receive information on career opportunities, invitations to selected IAAust events and online publications. You might also consider joining the IAAust – there are advantages in doing so while a full-time student. For membership information, go to <http://www.actuaries.asn.au/Membership/MembershipoftheInstitute.aspx>.

General Information for all Students

General Information for all students has been included on Wattle.