



MACQUARIE UNIVERSITY  
DIVISION OF ECONOMIC AND FINANCIAL STUDIES  
UNIT OUTLINE

**ACST 357 / 862 General Insurance Pricing and Reserving**  
**SECOND SEMESTER 2008**

<b>Unit convenor:</b>	<b>Piet de Jong</b>
<b>Prerequisites for ACST355:</b>	<b>ACST356 (P) or ACST 399 (P), STAT 271 (P)</b>
<b>Prerequisites for ACST862:</b>	<b>ACST861 (P), STAT 810 (P)</b>

Students in this unit should read this unit outline 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**

This unit examines the use of statistical models in general insurance. The models examined fall into three areas:

1. Time series analysis
2. Generalized linear models
3. Runoff triangle modelling and analysis.

In particular, we first consider the modern methods of time series analysis, both single time series and multiple time series. These models are often used for forecasting and inferring about the behaviour of time series. Time series analysis is followed by a consideration of generalized linear models. These models are often used in the pricing of insurance such as automobile or home owner insurance. Finally we will consider models and methods for runoff triangle analysis. Runoff triangles are used to model and predict the delay in the payment of insurance liabilities and hence are critical for reserving insurance liabilities.

A good knowledge of the material covered in STAT 271/810 is essential. You should revise this unit as soon as possible. Make sure you understand regression analysis, and the nature and use of a statistical model.

**TEACHING STAFF**

Piet de Jong is the unit convenor and will be taking all of the lectures in this unit. Her consultation hours are after classes on Thursday 3-4 and (other times may be available by appointment).

Stephen Chan is the teaching administrator for this unit. Administrative questions *that are not covered in this unit outline* should be directed to him via the Private Mail facility of the website. If the questions are of interest to everyone in the unit, the question and the reply will be posted to the Discussion Board, so you should specifically request if you want your message to remain private.

Questions about unit content should be sent to the Discussion Board of the website or raised during lectures, tutorials or consultation hours.

## **CLASSES**

Lectures are held Thursday 11 – 1 in E7B T2 and Friday 12 – 1 in W5A T1.

There will be a tutorial on Friday 13h – 14h. Tutorials start in week 2. Tutorials are held in W5A T1.

## CLASS ETIQUETTE

Mobile phones must be switched off during 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.

Do not talk in class so as not to disrupt your fellow students (and the lecturer!).

## REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS

### Optional text

The ActEd CT6 notes are an optional text for this unit. You may already have these notes if you bought them for ACST 356. The notes will be constantly referred to in the lectures and problems.

Those who want to view a copy of the ActEd CT6 notes should send a query to the teaching administrator using Private Mail in the ACST 357 / 862 website. Arrangements will 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 will be made available from time to time via ACST3557/ 862 website.

Read 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.

### Tables

The *Formulae and Tables for Actuarial Examinations* book is not required for this unit, and will not be provided in the examination.

### Other Texts

- **Time Series** by M Kendall (1976)
- **Time Series Analysis: Forecasting and Control** by George Box and Dwilym M. Jenkins, (1990)
- **Forecasting: Methods and Applications** (3<sup>rd</sup> edition) by Spyros G Makridakis, Steven C. Wheelwright, and Rob J. Hyndman (1988)
- **Statistical Methods for Forecasting** by Bovas Abraham and Johannes Ledolter (2005)
- **An Introduction to Generalised Linear Models** by Annette Dobson (2001) **Generalized Linear Models for Insurance Data** by Piet de Jong & Gillian Heller (2008)
- **Best Estimates for Reserves**, by Glen Barnett and Ben Zehnwrith, in Proceedings of the Casualty Actuarial Society, LXXXVII, No 166-167, pp 245-303 – see especially sections 1 & 2 and appendices A-D. This paper is on the list of readings for the Casualty Actuarial Society, and is available from [www.casact.org/pubs/proceed/proceed00/00245.pdf](http://www.casact.org/pubs/proceed/proceed00/00245.pdf) A list of errata for this paper and the spreadsheet that can carry out some of the calculations is at <http://www.insureware.com/Library/Technical/technical.php#BestEstimates>.

## UNIT WEB PAGE

To access the website, go to <http://learn.mq.edu.au> and login using your usual login and password. You will then have access to the websites for all the units in which you are enrolled. If you have any trouble logging in (e.g. you have forgotten your password), please contact the Library Information Customer Service Desk.

Before logging in, you should follow the link labelled “Technical Information” and read all the information there, including the Information Technology Security Policy and Rules and the Information Technology Usage Rules. This technical information also mentions a number of “plugins” that may be required. Of those listed, in this unit you will only need Acrobat Reader.

Remember to close your browser when you have finished using the site. If you don't, another person can use the still running browser to access the website with your account.

The web site will be used as an integral part of this unit. The main components of the website (listed on the left hand side toolbar) are:

### Course Content

- Unit outline: You can download this unit outline from here.
- Unit timetable: Again, you can download from the course website.
- Unit Notes: Complete notes including solutions to lecture exercises, and solutions to section exercises will be posted here for downloading.
- Data for Assessments: Any data that you need to complete the weekly quizzes or the four online assignments will be made available here.
- Revision exercises: Any additional revision exercises will be made available here.
- Tests and exams: Previous relevant examinations and tests for the course
- Links: Any web links you need to use will be made available here.

**Announcements.** The Announcements tool will be used to make general administrative announcements and to advise of any changes to class times, assessment requirements so on. It is your responsibility to make sure that you check the board frequently so that you are aware of these important announcements.

**Assessments.** Enter this section to submit your weekly quizzes and four online assignments.

**Calendar.** The calendar will list due dates of some items of assessment; however it is your responsibility to familiarise yourself with all assessment requirements including those not listed on the calendar.

**Discussions.** You should use the Discussion facility, along with the tutorial time, as your resource for asking questions about the content of the unit. Please address your questions to your fellow students – if there is no response or an incorrect response from the class the teaching staff will post a response. You are encouraged to post answers to other students' questions – this is one of the most effective ways to clarify your own understanding of the material. You should consult the Discussions frequently, to contribute to questions and see answers to queries.

**Mail.** You should use Private Mail to send administrative queries to the unit convenor or teaching administrator. Staff will also use Private Mail to contact you individually, if necessary. You may also use this facility to contact your fellow students. It is your responsibility to check the website regularly to make sure that you are up-to-date with messages sent to your Private Mail address.

## LEARNING OUTCOMES

The learning objectives of this unit are summarised at the start of each section of work. You should revise these after each week to ensure your understanding of the material.

In addition to the discipline-based learning objectives, all academic programs at Macquarie seek to develop students' generic skills in a range of areas. One of the aims of this unit is that students develop their skills in the following: *Critical analysis skills; Problem-solving skills.*

## TEACHING AND LEARNING STRATEGY

The unit material is covered in the three hours of lectures each week. The tutorial is an opportunity for you to attempt questions for each section of work, and ask the tutor questions.

A preliminary outline of classes is given on the following page. This may be adapted as the semester proceeds. Any alterations will be advised in lectures and via the website.

## RELATIONSHIP BETWEEN ASSESSMENT AND LEARNING OUTCOMES

This unit is assessed using a class test, regular short quizzes, a series of short 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. A preliminary schedule is given on the following 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).

### Assignments

The four assignments are worth a total of 10% of the final assessment for the unit. Assignment due dates are shown on the preliminary schedule, and are always at 5 pm. on a Monday.

### Quizzes

The nine quizzes are worth a total 5% 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. Quiz due dates are shown on the preliminary schedule, and are always at 5 pm. on a Monday.

### Class test

The test is worth 10% of the final assessment for the unit. Time and coverage of the class test will be announced in class. Marked tests will be returned to ERIC.

If you are affected by illness or unavoidable disruption at the time of the tests, you should contact the unit convenor immediately to discuss this and to make alternative arrangements. Applications for special consideration for the class test due to documented illness or unavoidable disruption **must** be made on the "Advice of Absence or other Circumstances" form. This is available from <http://www.reg.mq.edu.au/Forms/USSAbsence.pdf> and should be submitted to the Student Enquiry Service on Level 1 of the Lincoln Building (not direct to the unit convenor). See below for rules relating to applications for special consideration.

## Exam

The final examination is worth 75% of the final assessment for the unit. It is a three-hour written paper with ten minutes reading time.

All students are expected to ensure they are available up until the end of the teaching semester, that is, the final day of the official examination period. The University Examination period in Second Half Year 2008 is from 19 November to 5 December. 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://www.timetables.mq.edu.au/exam>.

Information about unavoidable disruption and the special consideration process is available at <http://www.reg.mq.edu.au/>. Applications for Special Consideration based on medical grounds must be accompanied by the Professional Authority Form. Applications omitting this form (such as those which only supply a doctor's certificate) are ignored.

### Rules regarding tests and examinations

Normal examination rules apply to the conduct of class tests and the final examination. These rules are set out under the heading "Conduct of Examinations" in the Student Information–Assessment section of the current Macquarie University Handbook of Undergraduate Studies. Students are responsible for familiarising themselves with these rules prior to the class tests and the final examination.

Ensure that your handwriting in the class tests and in the final examination is legible. **Sections of work that are not legible are not marked.** For true/false questions, answers that are not clearly identified as either T or F are marked wrong.

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 statistical tables that you require will be provided for you in the class tests and the final examination.

Calculators are allowed in the class tests and the final examination but a clear indication of the steps involved in every calculation must be shown. Machines with 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 are not permitted in the class tests or the final examination.

Academic Senate has resolved that mobile phones are not allowed in 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.

## EXEMPTIONS

The units ACST357 / 862 and ACST356 / 861 together correspond to the professional subject CT6. The exemption will be recommended if and only if a SNG of at least 60 is achieved in both units and the average SNG is at least 65.

## REVIEWING YOUR EXAM PAPERS

Second semester results are scheduled to be released at midnight at the start of Friday 19 December. Following the release of the results, some students ask to see their exam paper. The exam viewing day will be Tuesday 23 December. You will need to view the EFS web site ([www.efs.mq.edu.au](http://www.efs.mq.edu.au)) immediately after the results are released to determine how to request to view your paper. There will be a very limited time to make this request.

## PLAGIARISM

The University defines plagiarism in its rules: "Plagiarism involves using the work of another person and presenting it as one's own." Plagiarism is a serious breach of the University's rules and carries significant penalties. You must read the University's practices and procedures on plagiarism. These can be found in the *Handbook of Undergraduate Studies* or on the web at: <http://www.student.mq.edu.au/plagiarism/>. The policies and procedures explain what plagiarism is, how to avoid it, the procedures that will be taken in cases of suspected plagiarism, and the penalties if you are found guilty. Penalties may include a deduction of marks, failure in the unit, and/or referral to the University Discipline Committee.

## USE OF COMPUTERS FOR COURSEWORK

Please take careful note of the policy of the Department of Actuarial Studies regarding the use of computers, which follows.

### DEPARTMENT OF ACTUARIAL STUDIES NOTICE TO STUDENTS RE USE OF COMPUTERS FOR COURSEWORK

1. Computers do occasionally break down. This is a normal part of working life. When completing assignments, you should not leave computer work until the last moment, assuming the system will be available when you need it.
2. You are the person responsible for keeping backup copies of any data or files you create on a computer. If you fail to keep backup copies, loss of data or files, for whatever reason, is not an acceptable excuse for failing to complete an assignment on time.
3. You should have at least two backups. If you have only one backup disk, then a computer malfunction while you are updating your backups may simultaneously corrupt both the original version (on the hard disk or network) and your backup disk. Do not store your two backups together. Spread your risks.
4. If you are planning to write a document on one computer (eg. your home computer) and print it from a different computer, you should test well ahead of the due date that the second computer can print your document. This particularly applies if your documents incorporate graphs, tables, unusual fonts or special formatting.

## UNIVERSITY POLICY ON GRADING

Macquarie University uses the grades HD, D, Cr, P, PC and F for grading the achievements of students in units of study. The meaning of each symbol is explained in section 10 of the Bachelor Degree Rules in the current Macquarie University Handbook of Undergraduate Studies.

Academic Senate has a set of guidelines on the distribution of grades across the range from fail to high distinction. Your final result will include one of these grades plus a standardised numerical grade (SNG).

The numerical marks resulting from assessment of your work in this unit will be used as an initial indicator of the quality of your learning and understanding. The use of these numerical marks is, however, only a starting point in determining the appropriate grade. In particular, note that the SNG ranges mentioned in the Handbook of Undergraduate Studies are not the raw marks. To obtain a grade you must satisfy the qualitative definition of that grade. Once your grade has been determined, you are allocated an SNG indicating your approximate position amongst students assigned that grade.

## **STUDENT SUPPORT SERVICES**

Macquarie University provides a range of Academic Student Support Services. Details of these services can be accessed at <http://www.student.mq.edu.au>.

### **ERIC**

The EFS Resource and Information Centre (ERIC) is located in room E4B106 and offers photocopying facilities, reading areas and reference material. Class tests will be returned to ERIC. Information about facilities and services is at [http://www.efs.mq.edu.au/student\\_support/eric](http://www.efs.mq.edu.au/student_support/eric).

### **ACSTINFO**

This 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. To access the site, login at: <http://learn.mq.edu.au/> and the site should appear among your list of units. When you first login, please read the section labelled “How to use this site.” This contains useful information which will help you determine when there is new information on the site which you should read.

## **ELECTRONIC COMMUNICATION AND YOUR STUDENT FILE**

Every business keeps a record of its correspondence with its customers. The University is no exception and it maintains a file for every student. Staff are required to ensure that copies of all correspondence with you are added to your file. Historically, “correspondence” meant letters, but nowadays it also includes electronic communication such as email. Staff have some discretion here and might not file copies of trivial emails, but it is difficult to define precise boundaries here, so it is safer to assume that any email you send to a staff member will be added to your file.

Some people regard email as more ephemeral than a letter and thus tend to take less care with issues such as clarity of expression, grammar and spelling. Before sending an email to a staff member, a good question to ask yourself is: “If a member of staff is reviewing my student file prior to writing a reference for me, and they see a copy of this email, would that staff member gain a favourable impression of my level of communication skills?”

In this context, email includes communications you send to staff with the mail tool in the unit’s web site. It does not normally include postings you make to the discussion area. However, in those very rare cases where a student makes an inappropriate posting to the discussion area, a copy of the posting would be added to that student’s file.

## **INSTITUTE OF ACTUARIES OF AUSTRALIA**

You should consider joining the Institute of Actuaries of Australia, if you haven’t done so already. There are advantages in joining while a full-time student. Please refer to <http://www.actuaries.asn.au/AboutTheInstitute/Membership> for membership information.