# ACST840

## Quantitative Research Methods II

S2 Day 2017

*Dept of Applied Finance and Actuarial Studies*

## Contents

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# General Information

Unit convenor and teaching staff
Lecturer and unit convenor
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Contact via Email
See iLearn

Angela Chow
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Credit points
4

Prerequisites
(Admission to MActPrac or (admission to MCom in Actuarial Studies and 16cp)) and (STAT810 or STAT806)

Corequisites

Co-badged status

Unit description
This unit focuses on statistical approaches used in Business and Economics and related disciplines. Topics include statistical modelling, time series analysis, ARCH, GARCH model, longitudinal and panel data models, generalized linear models and limited dependent variables. The unit will also consider applications of the above models and techniques to the actuarial practice discipline.

## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

# Learning Outcomes

On successful completion of this unit, you will be able to:

1. Understand the theoretical basis of a range of statistical models used in actuarial research and the practice of modelling and inference using statistical models.

2. Critique, replicate and extend basic actuarial research using statistical models.

3. Ask questions and communicate problems relating to statistical models, and to explain and discuss ideas relating to implementation of statistical models.

4. Understand how a variety of statistical models are used in actuarial research and how empirical results are communicated in practice.

# General Assessment Information

It is the responsibility of students to view their marks for each within session assessment on iLearn within 20 working days of posting. If there are any discrepancies, students must contact the unit convenor immediately. Failure to do so will mean that queries received after the release of final results regarding assessment marks (not including the final exam mark) will not be addressed.

Assessment criteria for all assessment tasks will be provided on the unit iLearn site.

**Student Research Projects and writeup of Research Presentation**

As with most published research you will need to be quite economical with your use of words in these projects; expect them to require substantial editing to meet the length requirements, so you should budget your time as if writing a longer piece of work than it might seem from what will be submitted.

**Feedback prior to census date**

Note that the text relies completely on R in its practical presentation of research topics and few students will have used it before, it's necessary to gain some facility with it right at the start, so it's essential to cover a lot of material on R in the first lecture, the remainder of which lecture covers a variety of essential topics needed to understand the material for the subject. Further, there's also a public holiday on the day of the class for week two. This leaves only a *single* class covering assessable material before students would need to work on something on which they can get a sense of their progress. As a result, feedback will necessarily be limited - it will be in the form of a short workshop exercise made available by the second class (week 3) and discussed in that class. Students are then expected to work on that exercise before the third class in week 4 in order to be able to discuss it at that time, as part of their normal study for the subject (the nature of the research workshops held in some lecture times is discussed further in the Delivery and Resources section). Solutions will be made available on that date in week 4 and discussed in class. Students are expected to check their work against that and raise issues with it in the class. Any difficulties - whether technical or learning-related - with the task in the intervening week between the second and third class should be raised on the iLearn discussion group so that students can aid each other.  There won't be summative assessment of this task, but students who participate fully during the classes in weeks 3 and 4 and on iLearn during the intervening week will have formative information on their learning progress.

# Assessment Tasks

| Name | Weighting | Hurdle | Due |
|------|-----------|--------|-----|
| Report | 20% | No | 11 Sept 2017 |

| Name | Weighting | Hurdle | Due |
|------|-----------|--------|-----|
| Project | 40% | No | 23 Oct 2017 |
| Final Exam | 40% | No | Examination period |

## Report

Due: **11 Sept 2017**
Weighting: **20%**

Summarize, describe and critique a recently published research paper in a reputable actuarial or closely related journal (demography, finance, statistics, etc). You should explain what was done, how it was done, what its contributions were and how it might have been done better or differently. It should be expected that it will be necessary to read more widely than the specific paper you discuss.

Length: Approximately 2500 words. Submission should be via Turnitin at 2pm on the day of the class for that week, and also on paper at the start of the class.

No extensions will be granted. There will be a deduction of 10% of the total available marks made from the total awarded mark for each 24 hour period or part thereof that the submission is late (for example, 25 hours late in submission – 20% penalty). This penalty does not apply for cases in which an application for disruption of studies is made and approved. No submission will be accepted after solutions have been posted.

On successful completion you will be able to:

- 1. Understand the theoretical basis of a range of statistical models used in actuarial research and the practice of modelling and inference using statistical models.
- 4. Understand how a variety of statistical models are used in actuarial research and how empirical results are communicated in practice.

## Project

Due: **23 Oct 2017**
Weighting: **40%**

Perform a similar analysis to an existing piece of research, and either extend the analysis in some way or perform an alternate analysis on similar data, using some methodology covered in class (or by agreement with the lecturer for this part of the unit). Finding some suitable data will be important -- if you can't get any for the research you have in mind you must choose a different piece of research.

Note that there are a number of useful data sets available in a package associated with the textbook, some of which could be used for this purpose; some other data sources may be

mentioned during class or on iLearn.

Length: Approximately 5000 words, but a few pages of additional supplementary material may be included in a short appendix. You should hand in no more than 15 pages total, and fewer than 12 if there are few displays.

Submission should be via Turnitin at 2pm on the due date.

No extensions will be granted. There will be a deduction of 10% of the total available marks made from the total awarded mark for each 24 hour period or part thereof that the submission is late (for example, 25 hours late in submission – 20% penalty). This penalty does not apply for cases in which an application for disruption of studies is made and approved. No submission will be accepted after solutions have been posted.

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## Final Exam

Due: **Examination period**
Weighting: **40%**

Three hour written exam held during the university exam period.

You are permitted ONE A4 page of paper containing reference material printed on both sides. The material may be handwritten or typed. The page will not be returned to you at the end of the final examination.

On successful completion you will be able to:

- 1. Understand the theoretical basis of a range of statistical models used in actuarial research and the practice of modelling and inference using statistical models.
- 4. Understand how a variety of statistical models are used in actuarial research and how empirical results are communicated in practice.

# Delivery and Resources

**Lecture and Workshop times**

Classes for ACST840 are scheduled as per the class timetable available at http://www.timetables.mq.edu.au/. There will be 3 hours face-to-face teaching per week typically consisting of two hours of lecture and one hour of workshop, where students will be expected to

both ask and answer questions (of each other as well as the lecturer).

### Technology used and required

If you are enrolled in this unit, you will be listed in the ACST840 online unit (iLearn). Login at http://ilearn.mq.edu.au/ The site will be used to post any additional lecture slides, handouts, and assigned work. The site contains a forum to which you will be expected to contribute (you'll be expected to contribute to discussion relating to your research - and others' research, for example). Please log in to the site on a regular basis. This course requires access to the R statistical package.

### Required and Recommended Texts and/or Materials

The textbook *Computational Actuarial Science with R*, Arthur Charpentier (2014), CRC Press. The text will be available as an ebook via the library site for the subject.  Exercises may be assigned from this book, the lectures will be based on it, and it's a useful resource for the research topics for the second half of the course. [It is also available to buy, both as a paper book and an ebook.]

### Workshop exercises and discussion

Some weeks there will be exercises usually based on the previous week's material; attempting and discussing them will be an important part of the learning process for research. The performance on the exercises will not be assessed. Attempt any exercises during the week prior to the workshop they're to be discussed in, in order to be able to discuss them in iLearn beforehand, and in the face-to-face class time. Most exercises require access to and some familiarity with the R statistical package. When set, they will generally be covered in the last lecture hour and will usually be on material in the previous week, but broader questions relating to research - including issues relating to student projects - during workshop times are encouraged.

# Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy_2016.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy (in effect until Dec 4th, 2017): http://www.mq.edu.au/policy/docs/disruption_studies/policy.html

Special Consideration Policy (in effect from Dec 4th, 2017): https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration

In addition, a number of other policies can be found in the Learning and Teaching Category of

Policy Central.

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

## Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au.

# Supplementary Examinations

Further information regarding supplementary exams, including dates, is available here

*http://www.businessandeconomics.mq.edu.au/current_students/undergraduate/how_do_i/disruption_to_studies*

# Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

## Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

# Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

# Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

# IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.

# Graduate Capabilities

## PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

### Learning outcomes

- 1. Understand the theoretical basis of a range of statistical models used in actuarial research and the practice of modelling and inference using statistical models.
- 2. Critique, replicate and extend basic actuarial research using statistical models.
- 3. Ask questions and communicate problems relating to statistical models, and to explain and discuss ideas relating to implementation of statistical models.
- 4. Understand how a variety of statistical models are used in actuarial research and how empirical results are communicated in practice.

### Assessment tasks

- Report
- Project
- Final Exam

## PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

### Learning outcomes

- 2. Critique, replicate and extend basic actuarial research using statistical models.
- 3. Ask questions and communicate problems relating to statistical models, and to explain and discuss ideas relating to implementation of statistical models.

### Assessment task

- Project

## PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

### Learning outcomes

- 2. Critique, replicate and extend basic actuarial research using statistical models.
- 4. Understand how a variety of statistical models are used in actuarial research and how empirical results are communicated in practice.

### Assessment task

- Project

# Changes from Previous Offering

This offering has made some changes in topics and assessment tasks from the previous offering. It will be somewhat more similar in coverage of topics to the 2015 offering.