



# STAT700

## Research Frontiers in Statistics

S1 Day 2014

*Statistics*

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## General Information

Unit convenor and teaching staff

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E4A 507

Friday 2-4

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E4A 530

Monday 2 - 4 pm

Gillian Heller

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E4A 533

Thursday 12-2 pm

Unit Convenor

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E4A535

Tuesday 5-6, Thursday 2-3

Credit points

4

Prerequisites  
Admission to MRes

Corequisites

Co-badged status

Unit description

This unit covers selected topics on modern statistical methods including statistical modelling, computational statistics, bio- and medical statistics, statistical models in finance, modelling dependence and point processes. These topics are hot research areas of statistics. The topics will be delivered by reading research papers, discussions and presentations. Students are also required to attend department research seminars. Each topic will be taught in two weeks and then assessed by the lecturer delivering the topic.

## 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:

- Obtain a broad view of some research activities in various fields of statistics
- Read and discuss research papers in statistics
- Look for research papers using google or other search engines
- Understand the general structure of research papers
- Write research papers

## Assessment Tasks

| Name                    | Weighting | Due       |
|-------------------------|-----------|-----------|
| <a href="#">Topic 1</a> | 15%       | Mar 11th  |
| <a href="#">Topic 2</a> | 15%       | Mar 25th  |
| <a href="#">Topic 3</a> | 15%       | April 8th |
| <a href="#">Topic 4</a> | 15%       | May 6th   |
| <a href="#">Topic 5</a> | 15%       | June 6th  |
| <a href="#">Topic 6</a> | 15%       | May 20th  |

| Name   | Weighting | Due |
|--|-----------|-----|
| <a href="#"><u>Statistics department seminar</u></a> | 10%       | TBA |

## Topic 1

Due: **Mar 11th**

Weighting: **15%**

This topic will be on "Statistical modelling and model selection". Each topic will be assessed by the lecturer of that topic. Each topic weights 15% towards the final assessment. Topic assessment is based on presentation (13%) and participation (2%). Three core criteria will be used to assess students' work:

- (1) Knowledge Development: Understanding of key ideas and concepts.
- (2) Application: Ability to apply statistical concepts to actual problems.
- (3) Presentation: The extent to which work has been written and/or presented in a manner consistent with accepted academic standards.

Performance in relation to each of these criteria will be assessed against established standards.

On successful completion you will be able to:

- Obtain a broad view of some research activities in various fields of statistics
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- Look for research papers using google or other search engines
- Understand the general structure of research papers

## Topic 2

Due: **Mar 25th**

Weighting: **15%**

This topic will be on "Computational statistics, including EM, mixture distribution, LASSO". For assessment see topic 1

On successful completion you will be able to:

- Obtain a broad view of some research activities in various fields of statistics
- Read and discuss research papers in statistics
- Look for research papers using google or other search engines
- Understand the general structure of research papers

## Topic 3

Due: **April 8th**

Weighting: **15%**

This topic will be on "Point processes, including homogeneous and non-homogeneous Poisson processes and applications". For assessment see topic 1

On successful completion you will be able to:

- Obtain a broad view of some research activities in various fields of statistics
- Read and discuss research papers in statistics
- Look for research papers using google or other search engines
- Understand the general structure of research papers

## Topic 4

Due: **May 6th**

Weighting: **15%**

This topic will be on "Statistical models in finance, including ARCH & GARCH models". For assessment see topic 1

On successful completion you will be able to:

- Obtain a broad view of some research activities in various fields of statistics
- Read and discuss research papers in statistics
- Look for research papers using google or other search engines
- Understand the general structure of research papers

## Topic 5

Due: **June 6th**

Weighting: **15%**

This topic will be on "Bio- and medical statistics, including Cox model, censorings, recurrent events, multi-states". For assessment see topic 1

On successful completion you will be able to:

- Obtain a broad view of some research activities in various fields of statistics
- Read and discuss research papers in statistics
- Look for research papers using google or other search engines
- Understand the general structure of research papers

## Topic 6

Due: **May 20th**

Weighting: **15%**

This topic will be on "Time series and related CLT". For assessment see topic 1

On successful completion you will be able to:

- Obtain a broad view of some research activities in various fields of statistics
- Read and discuss research papers in statistics
- Look for research papers using google or other search engines
- Understand the general structure of research papers

## Statistics department seminar

Due: **TBA**

Weighting: **10%**

Students are required to attend the research seminars of Statistics Department. Their attendance and performance (asking questions and participation in discussions) will be used for this assessment.

On successful completion you will be able to:

- Obtain a broad view of some research activities in various fields of statistics
- Read and discuss research papers in statistics
- Look for research papers using google or other search engines
- Write research papers

## Delivery and Resources

### Lectures

Lectures begin in Week 1. Students should attend one 3-hour session per week. Papers and reading materials for each topic will be made available via iLearn. Students should read these materials prior to the lectures.

Each topic will last for two weeks. In the first week, the lecturer will give a brief introduction to the materials covered in that topic and introduce students to the papers that will be discussed. Each student will be given three papers to read. However, each student will be required to present one paper in the class in the second week. Students are encouraged to participate in presentations, i.e. ask questions and involve in discussions.

### Department research seminars

Students are also required to attend the research seminars of Statistics Department.

### Changes from previous offerings

None

### Technologies used and required

None

## Unit Schedule

| WEEK           | LECTURE TOPIC   | Lecturer          |
|----------------|---|-------------------|
| W1-2           | Statistical modelling and model selection   | Gillian Heller    |
| W3-4           | Computational statistics, including EM, mixture distribution, LASSO etc                       | Jun Ma            |
| W5-6           | Point processes, including homogeneous and non-homogeneous Poisson processes and applications | Maurizio Manuerra |
| Semester break |   |                   |
| W7-8           | Statistical models in finance, including ARCH & GARCH models etc                              | Thomas Fung       |
| W9-10          | Bio- and medical statistics, including Cox model, censorings, recurrent events, multi-states  | Ken Beath         |
| W11-12         | Time series and related CLT   | Barry Quinn       |

## 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](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

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

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

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

Grievance Management Policy [http://mq.edu.au/policy/docs/grievance\\_management/policy.html](http://mq.edu.au/policy/docs/grievance_management/policy.html)

[t/policy.html](#)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html) *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

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/](https://students.mq.edu.au/support/student_conduct/)

## 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](http://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](http://ask.mq.edu.au)

## IT Help

For help with University computer systems and technology, visit <http://informatics.mq.edu.au/help/>.

When using the University's IT, you must adhere to the [Acceptable Use Policy](#). The policy applies to all who connect to the MQ network including students.