STAT700
Research Frontiers in Statistics
S1 Day 2016
Dept of Statistics

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General Information

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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://students.mq.edu.au/important-dates](https://students.mq.edu.au/important-dates)

Learning Outcomes
1. Obtain a broad view of some research activities in various fields of statistics
2. Read and discuss research papers in statistics
3. Look for research papers using google or other search engines
4. Understand the general structure of research papers
5. Write research papers

Assessment Tasks

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic 1</td>
<td>15%</td>
<td>10 March</td>
</tr>
<tr>
<td>Topic 2</td>
<td>15%</td>
<td>24 March</td>
</tr>
<tr>
<td>Topic 3</td>
<td>15%</td>
<td>7 April</td>
</tr>
<tr>
<td>Topic 4</td>
<td>15%</td>
<td>5 May</td>
</tr>
<tr>
<td>Topic 5</td>
<td>15%</td>
<td>19 May</td>
</tr>
<tr>
<td>Topic 6</td>
<td>15%</td>
<td>2 June</td>
</tr>
<tr>
<td>Statistics department seminar</td>
<td>10%</td>
<td>TBA</td>
</tr>
</tbody>
</table>
Topic 1
Due: **10 March**
Weighting: **15%**

"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.

This Assessment Task relates to the following Learning Outcomes:

- 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 2
Due: **24 March**
Weighting: **15%**

"Computational statistics, including EM, mixture distribution, LASSO".

For assessment see topic 1

This Assessment Task relates to the following Learning Outcomes:

- 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: **7 April**
Weighting: **15%**

"Frequency estimation"

For assessment see topic 1
This Assessment Task relates to the following Learning Outcomes:

- 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: 5 May
Weighting: 15%

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

This Assessment Task relates to the following Learning Outcomes:

- 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: 19 May
Weighting: 15%

"Statistical models in finance, including ARCH & GARCH models"
For assessment see topic 1

This Assessment Task relates to the following Learning Outcomes:

- 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: 2 June
Weighting: 15%

"Change point detection".
For assessment see topic 1
This Assessment Task relates to the following Learning Outcomes:

- 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.

This Assessment Task relates to the following Learning Outcomes:

- 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

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>Statistical modelling and model selection</td>
<td>Gillian Heller</td>
</tr>
<tr>
<td>3-4</td>
<td>Computational statistics, including EM, mixture distribution, LASSO</td>
<td>Jun Ma</td>
</tr>
<tr>
<td>5-6</td>
<td>Frequency estimation</td>
<td>Barry Quinn</td>
</tr>
<tr>
<td></td>
<td>Midsemester break</td>
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<tr>
<td>7-8</td>
<td>Bio- and medical statistics, including Cox model, censorings, recurrent events, multi-states</td>
<td>Ken Beath</td>
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<tr>
<td>9-10</td>
<td>Statistical models in finance, including ARCH &amp; GARCH models etc</td>
<td>Thomas Fung</td>
</tr>
<tr>
<td>11-12</td>
<td>Change-point detection</td>
<td>Georgy Sofronov</td>
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## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](http://mq.edu.au/policy/docs/). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- In addition, a number of other policies can be found in the [Learning and Teaching Category](http://www.mq.edu.au/policy/docs/) 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/)
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.

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 Enquiry Service

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

Equity 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.

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.

Changes since First Published

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/03/2016</td>
<td>Topic 3 title changed.</td>
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