STAT700
Research Frontiers in Statistics
S1 Day 2014

Statistics

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# General Information

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Unit Convenor
Jun Ma
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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

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>Mar 11th</td>
</tr>
<tr>
<td>Topic 2</td>
<td>15%</td>
<td>Mar 25th</td>
</tr>
<tr>
<td>Topic 3</td>
<td>15%</td>
<td>April 8th</td>
</tr>
<tr>
<td>Topic 4</td>
<td>15%</td>
<td>May 6th</td>
</tr>
<tr>
<td>Topic 5</td>
<td>15%</td>
<td>June 6th</td>
</tr>
<tr>
<td>Topic 6</td>
<td>15%</td>
<td>May 20th</td>
</tr>
<tr>
<td>Statistics department seminar</td>
<td>10%</td>
<td>TBA</td>
</tr>
</tbody>
</table>
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.

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: **Mar 25th**
Weighting: **15%**

This topic will be on "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: **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
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:** May 6th  
**Weighting:** 15%

This topic will be on "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 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

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:** May 20th  
**Weighting:** 15%

This topic will be on "Time series and related CLT". 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>LECTURE TOPIC</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1-2</td>
<td>Statistical modelling and model selection</td>
<td>Gillian Heller</td>
</tr>
<tr>
<td>W3-4</td>
<td>Computational statistics, including EM, mixture distribution, LASSO etc</td>
<td>Jun Ma</td>
</tr>
<tr>
<td>W5-6</td>
<td>Point processes, including homogeneous and non-homogeneous Poisson processes and applications</td>
<td>Maurizio Manuguerra</td>
</tr>
<tr>
<td>Semester break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W7-8</td>
<td>Statistical models in finance, including ARCH &amp; GARCH models etc</td>
<td>Thomas Fung</td>
</tr>
<tr>
<td>W9-10</td>
<td>Bio- and medical statistics, including Cox model, censorings, recurrent events, multi-states</td>
<td>Ken Beath</td>
</tr>
<tr>
<td>W11-12</td>
<td>Time series and related CLT</td>
<td>Barry Quinn</td>
</tr>
</tbody>
</table>

### 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:

- **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/](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 Enquiry Service**

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://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**


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.