STAT700

Research Frontiers in Statistics

S1 Day 2017

Dept of Statistics

Contents

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://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

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

Be able to obtain a broad view of some research activities in various fields of statistics

Be able to read and discuss research papers in statistics

Be able to utilise google or other search engines to look for research papers

Be able to recognise the general structure of research papers

Be able to write research papers

Assessment Tasks

Name	Weighting	Hurdle	Due
Topic 1	15%	No	8 March
Topic 2	15%	No	22 March
Topic 3	15%	No	5 April
Topic 4	15%	No	3 May
Topic 5	15%	No	17 May
Topic 6	15%	No	31 May

Name	Weighting	Hurdle	Due
Statistics department seminar	10%	No	TBA

Topic 1

Due: **8 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 contribution to the discussion (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:
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- Be able to utilise google or other search engines to look for research papers
- Be able to recognise the general structure of research papers

Topic 2

Due: **22 March**
Weighting: **15%**

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

For assessment see topic 1

On successful completion you will be able to:
- Be able to obtain a broad view of some research activities in various fields of statistics
- Be able to read and discuss research papers in statistics
- Be able to utilise google or other search engines to look for research papers
- Be able to recognise the general structure of research papers

Topic 3

Due: **5 April**
Weighting: **15%**

"Frequency estimation"

For assessment see topic 1

On successful completion you will be able to:
- Be able to obtain a broad view of some research activities in various fields of statistics
- Be able to read and discuss research papers in statistics
- Be able to utilise google or other search engines to look for research papers
- Be able to recognise the general structure of research papers

Topic 4

Due: **3 May**
Weighting: **15%**

"Change point detection".

For assessment see topic 1

On successful completion you will be able to:
- Be able to obtain a broad view of some research activities in various fields of statistics
- Be able to read and discuss research papers in statistics
- Be able to utilise google or other search engines to look for research papers
- Be able to recognise the general structure of research papers

Topic 5

Due: **17 May**
Weighting: **15%**

"Statistical models in finance, including ARCH & GARCH models"

For assessment see topic 1

On successful completion you will be able to:
- Be able to obtain a broad view of some research activities in various fields of statistics
- Be able to read and discuss research papers in statistics
- Be able to utilise google or other search engines to look for research papers
- Be able to recognise the general structure of research papers

Topic 6

Due: **31 May**
Weighting: **15%**

"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:
- Be able to obtain a broad view of some research activities in various fields of statistics
- Be able to read and discuss research papers in statistics
- Be able to utilise google or other search engines to look for research papers
- Be able to recognise 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:
- Be able to obtain a broad view of some research activities in various fields of statistics
- Be able to read and discuss research papers in statistics
- Be able to utilise google or other search engines to look for research papers
- Be able to 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	Topic	Lecturer
1-2	Statistical modelling and model selection	Gillian Heller
3-4	Computational statistics, including EM, mixture distribution, LASSO	Jun Ma
5-6	Frequency estimation	Barry Quinn
7-8	Change-point detection	Georgy Sofronov
9-10	Statistical models in finance, including ARCH & GARCH models etc	Thomas Fung
11-12	Bio- and medical statistics, including Cox model, censorings, recurrent events, multi-states	Ken Beath

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.

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.

Changes since First Published

Date	Description
14/02/2017	The learning outcomes are updated.