# STAT723

## Statistical Graphics

S1 Day 2016

*Dept of Statistics*

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## Disclaimer

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General Information

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TBA

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None
None

Credit points
4

Prerequisites
Admission to MRes

Corequisites

Co-badged status
STAT823

Unit description
We present the principles of effective graphical presentation, set them in a historical context and apply them to a variety of statistical data sets. Emphasis is given to use of modern multivariate graphical techniques such as trellis/lattice graphs and mosaic plots to show a variety of displays of data and model fits, and to display model consistency with data. To present graphics, we introduce and use S-Plus and R software, as well as other standard packages. Participants choose an area for further investigation related to their interests.

Important Academic Dates
Information about important academic dates including deadlines for withdrawing from units are available at http://students.mq.edu.au/student_admin/enrolmentguide/academicdates/
Learning Outcomes

1. Be familiar with important and contemporary examples of graphics, and be able to use them as models in their own work.
2. Be aware of the elements of graphical design, and use them to critically appraise presented graphics in articles and web pages and suggest appropriate ways of improving them.
3. Be familiar with a range of modern multivariate graphical techniques and know when it is appropriate to use them.
4. Be able to use the computer to generate appropriate graphics using particular packages or languages and be able to develop the ability to do so in others.
5. Use statistical graphics to investigate and analyse data, check statistical model assumptions and effectively present the results of statistical investigations to a range of audiences.
6. Be aware of the ethical aspects associated with the use of statistical graphics in society.

General Assessment Information

Late assessments will only be marked if a valid Disruption to Studies has been submitted.

Assessment Tasks

<table>
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<tr>
<th>Name</th>
<th>Weighting</th>
<th>Due</th>
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<tr>
<td>Portfolio</td>
<td>25%</td>
<td>TBA</td>
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<tr>
<td>Project</td>
<td>25%</td>
<td>2pm 6 June 2016</td>
</tr>
<tr>
<td>Project Presentation</td>
<td>15%</td>
<td>Week 12 Classes</td>
</tr>
<tr>
<td>Take-home Examination</td>
<td>35%</td>
<td>2pm Sunday 12 June 2016</td>
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Portfolio

Due: TBA
Weighting: 25%

An individual portfolio of five items relating to statistical graphics, each item using a maximum of two pages, on topics or questions presented in classes (and on the website). You will be asked to submit these online, and they will be graded on a scale of 1-5 each. The portfolio items will have various suggested due dates, but the complete series will have a final deadline of Monday 2 May.
This Assessment Task relates to the following Learning Outcomes:

- Be familiar with important and contemporary examples of graphics, and be able to use them as models in their own work.
- Be aware of the elements of graphical design, and use them to critically appraise presented graphics in articles and web pages and suggest appropriate ways of improving them.
- Be familiar with a range of modern multivariate graphical techniques and know when it is appropriate to use them.
- Be able to use the computer to generate appropriate graphics using particular packages or languages and be able to develop the ability to do so in others.
- Use statistical graphics to investigate and analyse data, check statistical model assumptions and effectively present the results of statistical investigations to a range of audiences.
- Be aware of the ethical aspects associated with the use of statistical graphics in society.

Project

Due: 2pm 6 June 2016
Weighting: 25%

A solo project in an area of interest that you select. A written report must be submitted (maximum length 3500 words).

The written report must be submitted in pdf format online via iLearn by 2 pm on the due date. This can be done in Word or using freeware such as Cute PDF Writer. There is no "group work" assessment in this unit. All work is to be the student's own. Students who have not submitted the assignment prior to the deadline will be awarded a mark of 0 for the assignment, except for cases in which an application for Disruption to Studies is made and approved.

This Assessment Task relates to the following Learning Outcomes:

- Be familiar with important and contemporary examples of graphics, and be able to use them as models in their own work.
- Be aware of the elements of graphical design, and use them to critically appraise presented graphics in articles and web pages and suggest appropriate ways of improving them.
- Be familiar with a range of modern multivariate graphical techniques and know when it is appropriate to use them.
- Be able to use the computer to generate appropriate graphics using particular packages or languages and be able to develop the ability to do so in others.
Use statistical graphics to investigate and analyse data, check statistical model assumptions and effectively present the results of statistical investigations to a range of audiences.

Be aware of the ethical aspects associated with the use of statistical graphics in society.

**Project Presentation**

**Due:** **Week 12 Classes**
**Weighting:** **15%**

Presentation of Project. Ten minutes long followed by 5 minutes for questions.

This Assessment Task relates to the following Learning Outcomes:

- Be familiar with important and contemporary examples of graphics, and be able to use them as models in their own work.
- Be aware of the elements of graphical design, and use them to critically appraise presented graphics in articles and web pages and suggest appropriate ways of improving them.
- Be familiar with a range of modern multivariate graphical techniques and know when it is appropriate to use them.
- Be able to use the computer to generate appropriate graphics using particular packages or languages and be able to develop the ability to do so in others.
- Use statistical graphics to investigate and analyse data, check statistical model assumptions and effectively present the results of statistical investigations to a range of audiences.
- Be aware of the ethical aspects associated with the use of statistical graphics in society.

**Take-home Examination**

**Due:** **2pm Sunday 12 June 2016**
**Weighting:** **35%**

You will be given an individual take-home examination at the end of Week 12 (available on the morning of Saturday 4 June, 2016). This will be in the form of a consulting problem requiring data analysis and preparation of a report including presentation graphics, requiring about 3-6 hours work. A word processed written report must be submitted in pdf format online via iLearn by **2 pm on the due date**. This can be done in Word or using freeware such as Cute PDF Writer. There is no "group work" assessment in this unit. All work is to be the student's own. Students who have not submitted the written report prior to the deadline will be awarded a mark of 0 for the Take-home exam, except for cases in which an application for Disruption to Studies is made and approved.
This Assessment Task relates to the following Learning Outcomes:

- Be familiar with important and contemporary examples of graphics, and be able to use them as models in their own work.
- Be aware of the elements of graphical design, and use them to critically appraise presented graphics in articles and web pages and suggest appropriate ways of improving them.
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- Be aware of the ethical aspects associated with the use of statistical graphics in society.

**Delivery and Resources**

There is a two hour lecture scheduled followed by a one hour practical. Another practical will be scheduled if the need arises.

There is no specified textbook for this unit and a variety of readings will be made available on iLearn. The following books are good general references that will be used during the semester:


With the relatively small number of students enrolled and the advanced (masters) level of this unit, we will be relying less on formal lectures and more on individual reading, preparation and learning to use the computer, and on collaborative investigation and discussion of problems. However, we may have a number of ‘guest lectures’ which will be presented live and be available in some electronic form afterwards. There will be weekly readings (usually electronic), weekly data investigations (using a computer package or language), weekly discussions (live or electronic) and regular opportunities to create and add materials to your portfolio.

**Technologies used**
The unit will make use of a range of packages, most importantly R, and the graphing packages Mondrian and GGobi.

**Unit Schedule**
Topics covered include historical graphics (Week 1), introducing R for graphics (Week 3), principles of graphics (Week 4), trellis graphs (Week 5), linear models and graphics (Week 6), mosaic plots (Week 7), parallel coordinates (Week 8), time and time-oriented data (Week 9), visual data mining (Week 10), and more on high dimensional graphics (Week 11).

**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:


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/)

**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](http://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/](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.

Graduate Capabilities

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

- Be familiar with important and contemporary examples of graphics, and be able to use them as models in their own work.
- Be familiar with a range of modern multivariate graphical techniques and know when it is appropriate to use them.
- Use statistical graphics to investigate and analyse data, check statistical model assumptions and effectively present the results of statistical investigations to a range of audiences.
PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

**Learning outcome**

- Use statistical graphics to investigate and analyse data, check statistical model assumptions and effectively present the results of statistical investigations to a range of audiences.

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**

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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

• Be familiar with a range of modern multivariate graphical techniques and know when it is appropriate to use them.
• Be able to use the computer to generate appropriate graphics using particular packages or languages and be able to develop the ability to do so in others.
• Use statistical graphics to investigate and analyse data, check statistical model assumptions and effectively present the results of statistical investigations to a range of audiences.

PG - Engaged and Responsible, Active and Ethical Citizens

Our postgraduates will be ethically aware and capable of confident transformative action in relation to their professional responsibilities and the wider community. They will have a sense of connectedness with others and country and have a sense of mutual obligation. They will be able to appreciate the impact of their professional roles for social justice and inclusion related to national and global issues.

This graduate capability is supported by:

Learning outcomes

• Be familiar with important and contemporary examples of graphics, and be able to use them as models in their own work.
• Be aware of the elements of graphical design, and use them to critically appraise presented graphics in articles and web pages and suggest appropriate ways of improving them.

PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

Learning outcomes

• Be familiar with important and contemporary examples of graphics, and be able to use them as models in their own work.
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