



STAT823

Statistical Graphics

S1 External 2016

Dept of Statistics

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General Information

Unit convenor and teaching staff

Unit Convenor and Lecturer

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TBA

Tutor

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None

None

Credit points

4

Prerequisites

Admission to MAppStat or PGDipAppStat or PGCertAppStat or GradDipAppStat or (STAT830 and admission to (MBiotech or MBioBus))

Corequisites

Co-badged status

STAT723

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. This unit is appropriate for study at any stage of the student's: as an introduction early in the program, or as an overview towards the end of the program.

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 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.

General Assessment Information

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

Assessment Tasks

Name	Weighting	Due
<u>Portfolio</u>	25%	TBA
<u>Project</u>	25%	2pm 6 June 2016
<u>Project Presentation</u>	15%	8:30am 1 June 2016
<u>Take-home Examination</u>	35%	2pm Sunday 12 June 2016

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 by email to the unit convenor as a slide presentation with voice over and they will be graded on a scale of 1-5 each. Some suggested software to do this can be found from the following website: <http://elearningindustry.com/top-10-free-camtasia-studio-alternatives>, you may

use other software. The portfolio items will have various suggested due dates, but the complete series will have a final deadline of Monday 2 May.

On successful completion you will be able to:

- 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.

On successful completion you will be able to:

- 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: **8:30am 1 June 2016**

Weighting: **15%**

Presentation of Project. Should be ten minutes long. Must be a slide presentation with voice over submitted by email to the unit convenor. Some suggested software to do this can be found from the following website: <http://elearningindustry.com/top-10-free-camtasia-studio-alternatives>, you may use other software.

On successful completion you will be able to:

- 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 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). 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.

On successful completion you will be able to:

- 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.

Delivery and Resources

Lectures will be recorded with visual capture and put up on iLearn.

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:

- Tufte, E. (2001). *The Visual Display of Quantitative Information* (second edition). Graphics Press: Cheshire Conn.
- Tufte, E. (1990). *Envisioning Information*. Graphics Press: Cheshire Conn.
- Tufte, E. (1997). *Visual Explanations: images, and quantities, evidence and narrative* (third edition). Graphics Press: Cheshire Conn.
- Cleveland, W. (1993). *Visualizing Data*. Hobart Press, New Jersey.
- Chen, C., Hardle, W. and Unwin, E. (eds.) (2008). *Handbook of Data Visualization*. [HDV] Springer-Verlag, Berlin.

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:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

New Assessment Policy in effect from Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy_2016.html. For more information visit http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/

Assessment Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/grading/policy.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 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/

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.

Graduate Capabilities

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.
- 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 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.

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

- 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.

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 - 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 - 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 - 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.