STAT6102

Graphics, Multivariate Methods and Data Mining

Session 2, Online-scheduled-weekday 2023

School of Mathematical and Physical Sciences

Contents

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General Information

Unit convenor and teaching staff
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Credit points
10

Prerequisites
STAT6170 or STAT670

Corequisites
STAT6180 or STAT680

Co-badged status

Unit description
This unit introduces statistical tools for multivariate data analysis such as statistical graphics, discriminant analysis, principal component analysis, cluster analysis and an introduction to data mining, especially classification. Statistical packages are used extensively to illustrate the concepts.

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:

ULO1: Interpret and apply principles underlying statistical data visualisation, multivariate methods and data mining to problems arising from diverse fields of research.

ULO2: Choose appropriate graphical techniques for displaying data.

ULO3: Choose the appropriate statistical analysis, for a given data set, from a wide range ofmethods based on multivariate methods and data mining.

ULO4: Use a statistical computer package to carry out chosen analyses and interpret the results;present the results of analyses in a form which is suitable for technical report or

publication.

General Assessment Information

REQUIREMENTS TO PASS THIS UNIT

To pass this unit you must:

- Achieve a total mark equal to or greater than 50%

All assignments are individual assessment tasks. There is no group work. More details will be provided on the iLearn page in due course.

HURDLE ASSESSMENTS

There is no hurdle assessment.

LATE SUBMISSION OF WORK

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark of the task) will be applied for each day a written report or presentation assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. The submission time for all uploaded assessments is 11:55 pm. A 1-hour grace period will be provided to students who experience a technical concern.

For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, please apply for Special Consideration.

Assessments where Late Submissions will be accepted

- SGTA Works - NO, unless Special Consideration is granted
- Mid-Semester Test - NO, unless Special Consideration is granted
- Practical Test - NO, unless Special Consideration is granted

SPECIAL CONSIDERATION

The Special Consideration Policy aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment. If you experience circumstances or events that affect your ability to complete the assessments in this unit on time, please inform the convenor and submit a Special Consideration request through ask.mq.edu.au.

ASSIGNMENT SUBMISSION

Assignment submission will be online through the iLearn page. Read the submission statement carefully before accepting it as there are substantial penalties for making a false declaration. It is your responsibility to make sure your assignment submission is legible. If there are technical obstructions to your submission online, please email us to let us know. You may submit as often as required prior to the due date/time. Please note that each submission will completely replace any previous submissions. It is in your interests to make frequent submissions of your partially

completed work as insurance against technical or other problems near the submission deadline.

Assessment Tasks

Name	Weighting	Hurdle	Due
SGTA Works	10%	No	Week 3; 5; 7; 10
Mid-Semester test	30%	No	Week 8
Practical Test	60%	No	Week 12

SGTA Works

Assessment Type [1]: Qualitative analysis task
Indicative Time on Task [2]: 40 hours
Due: **Week 3; 5; 7; 10**
Weighting: **10%**

The tasks given during four SGTA computer lab sessions are to be completed within the allocated time and submitted via iLearn. The four SGTA Works are worth 10% in total.

On successful completion you will be able to:

- Choose appropriate graphical techniques for displaying data.
- Choose the appropriate statistical analysis, for a given data set, from a wide range ofmethods based on multivariate methods and data mining.
- Use a statistical computer package to carry out chosen analyses and interpret the results;present the results of analyses in a form which is suitable for technical report or publication.

Mid-Semester test

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 1 hours
Due: **Week 8**
Weighting: **30%**

Further information for this online test will be provided in the iLearn site of the unit.

On successful completion you will be able to:

- Interpret and apply principles underlying statistical data visualisation, multivariate methods and data mining to problems arising from diverse fields of research.
- Choose appropriate graphical techniques for displaying data.
- Choose the appropriate statistical analysis, for a given data set, from a wide range ofmethods based on multivariate methods and data mining.

Practical Test

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 2 hours
Due: **Week 12**
Weighting: **60%**

This is an open book style online exam. The practical test is designed to examine the use of software for data analysis and the software output interpretation skills taught in the unit.

On successful completion you will be able to:

- Interpret and apply principles underlying statistical data visualisation, multivariate methods and data mining to problems arising from diverse fields of research.
- Choose appropriate graphical techniques for displaying data.
- Choose the appropriate statistical analysis, for a given data set, from a wide range ofmethods based on multivariate methods and data mining.
- Use a statistical computer package to carry out chosen analyses and interpret the results;present the results of analyses in a form which is suitable for technical report or publication.

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[1] If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the Writing Centre for academic skills support.

[2] Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

Classes

Lectures (beginning in Week 1): There is one one-hour online lecture each week and two-hours of pre-recorded material.

SGTA classes (beginning in Week 2): Students must register in and attend one two-hour class per week.

The timetable for classes can be found on the University website at: https://timetables.mq.edu.au/

Enrolment can be managed using eStudent at: https://students.mq.edu.au/support/technology/systems/estudent

Suggested Textbooks

The following books are highly recommended reading materials.

- Chambers J M et al (1983) Graphical Methods for Data Analysis;

- Cleveland W S (1994) Elements of Graphing Data;

- Tufte E R (2001) The Visual Display of Quantitative Information;

- Everitt B S et al (2001) Applied multivariate data analysis;

- Johnson, R.A. & Wichern, D.W. (2002) Applied Multivariate Statistical Analysis;

- Manly, B F J (2004) Multivariate Statistical Methods - A Primer.

Technology Used and Required

This subject requires the use of the following computer software:

- **R**: R is a free statistical software package. Access and installation instructions may be found at: https://www.r-project.org/
- **RStudio:** RStudio is an open-source tool that is used to manage and present work performed using R. Access and installation instructions may be found at https://rstudio.com/products/rstudio/download/

Communication

We will communicate with you via your university email, iLearn forums, or through announcements on iLearn. Queries to the convenors can either be placed on the iLearn discussion board or sent to the staff email address from your university email address.

COVID Information

For the latest information on the University's response to COVID-19, please refer to the Coronavirus infection page on the Macquarie website: https://www.mq.edu.au/about/coronavirus-faqs. Remember to check this page regularly in case the information and requirements change during semester. If there are any changes to this unit in relation to COVID, these will be communicated via iLearn.

Unit Schedule

Week	Topic	Due
	Introduction	
	Different graphical displays	
	Displaying multivariate data	SGTA Work
	Similarities and distances	
	Hierarchical cluster analysis	SGTA Work
	K-means clustering	
	Eigenvalues and eigenvectors	SGTA Work
	Principal component analysis	Mid-Semester Test
	Principal component analysis cont.	
	Discriminant analysis	SGTA Work
	Classification Trees Revision	
	Final assessment:	Practical Test

Policies and Procedures

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

- Academic Appeals Policy
- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy

- Fitness to Practice Procedure

- Assessment Procedure

- Complaints Resolution Procedure for Students and Members of the Public

- Special Consideration Policy

Students seeking more policy resources can visit Student Policies (https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit Policy Central (https://policies.mq.edu.au) and use the search tool.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/admin/other-resources/student-conduct

Results

Results published on platform other than eStudent, (eg. iLearn, Coursera etc.) 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 or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe academic integrity – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free online writing and maths support, academic skills development and wellbeing consultations.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

The Writing Centre

The Writing Centre provides resources to develop your English language proficiency, academic writing, and communication skills.

- Workshops

- Chat with a WriteWISE peer writing leader

- Access StudyWISE

- Upload an assignment to Studiosity

- Complete the Academic Integrity Module

The Library provides online and face to face support to help you find and use relevant information resources.

- Subject and Research Guides
- Ask a Librarian

Student Services and Support

Macquarie University offers a range of Student Support Services including:

- IT Support
- Accessibility and disability support with study
- Mental health support
- Safety support to respond to bullying, harassment, sexual harassment and sexual assault
- Social support including information about finances, tenancy and legal issues
- Student Advocacy provides independent advice on MQ policies, procedures, and processes

Student Enquiries

Got a question? Ask us via AskMQ, or contact Service Connect.

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 from Previous Offering

This offering will use R and RStudio to perform all coding activities. This is a change from previous offerings which used both R and SPSS.

The SGTA content has also be updated to reflect the change in main programming language.