COGS2020

Experimental Design and Data Analysis for the Cognitive and Brain Sciences

Session 1, Weekday attendance, North Ryde 2021

Archive (Pre-2022) - Department of Cognitive Science

Contents

Notice

As part of Phase 3 of our return to campus plan, most units will now run tutorials, seminars and other small group activities on campus, and most will keep an online version available to those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face activities for your unit, please go to timetable viewer. To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

General Information

Unit convenor and teaching staff
Matthew Crossley
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Tutor
Juan Andres Mucarquer Fuentes
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Credit points
10

Prerequisites
STAT1170 or STAT170

Corequisites

Co-badged status

Unit description
In this unit, students will learn essential principles of experimental design and data analysis skills for research in the cognitive and brain sciences. Students will gain first-hand experience applying these skills by analysing real-life behavioural and neural data sets such as those from fMRI, MEG, and EEG. Students will learn the R programming language, which is widely used throughout the statistics and data science communities in academia and private industry. Topics covered include programming statistical analyses and visualising data in R, effective experimental design for hypothesis testing, and critically examining the results of statistical analyses in the cognitive and brain sciences.

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: Program statistical analyses using the R programming language.

ULO2: Generate data visualisations and publication-quality summary figures using the R programming language.

ULO3: Design experiments and apply appropriate statistical methods to test hypotheses in the cognitive and brain sciences.

ULO4: Interpret and critically evaluate the results of statistical analyses.

General Assessment Information

Late Penalty

Late submissions will attract a penalty of 50%. This is because assignment solutions will be posted online immediately after their due dates, and this givens students that submit late an advantage over those that submit on time. Special arrangements will be considered for hardship due to COVID-19 and other similar circumstances.Please note that it is the student's responsibility to notify the University of a disruption to their studies and that requests for extensions for assignments must be made via the University's Ask MQ System (as outlined in the Disruption to Studies Policy).

Assessment Tasks

Name	Weighting	Hurdle	Due
Final exam	30%	No	Final exam period
Weekly problem sets	30%	No	Approximately weekly
Weekly online quizzes	10%	No	approximately weekly
Mid-term exam	30%	No	Mid semester

Final exam

Assessment Type [1]: Examination
Indicative Time on Task [2]: 20 hours
Due: **Final exam period**
Weighting: **30%**

2-hour exam

On successful completion you will be able to:

- Program statistical analyses using the R programming language.
- Generate data visualisations and publication-quality summary figures using the R programming language.
- Design experiments and apply appropriate statistical methods to test hypotheses in the cognitive and brain sciences.
- Interpret and critically evaluate the results of statistical analyses.

Weekly problem sets

Assessment Type [1]: Problem set
Indicative Time on Task [2]: 40 hours
Due: **Approximately weekly**
Weighting: **30%**

10 problem sets

On successful completion you will be able to:

- Program statistical analyses using the R programming language.
- Generate data visualisations and publication-quality summary figures using the R programming language.
- Design experiments and apply appropriate statistical methods to test hypotheses in the cognitive and brain sciences.
- Interpret and critically evaluate the results of statistical analyses.

Weekly online quizzes

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 10 hours
Due: **approximately weekly**
Weighting: **10%**

10 short online multiple quizzes designed to provide routine assessment and feedback. Graded on credit/no-credit basis. The 2 lowest quizzes (missed or marked non-credit) may be dropped without penalty.

On successful completion you will be able to:

- Program statistical analyses using the R programming language.
- Generate data visualisations and publication-quality summary figures using the R programming language.
- Design experiments and apply appropriate statistical methods to test hypotheses in the cognitive and brain sciences.
- Interpret and critically evaluate the results of statistical analyses.

Mid-term exam

Assessment Type [1]: Examination
Indicative Time on Task [2]: 15 hours
Due: **Mid semester**
Weighting: **30%**

1-hour mid-term exam

On successful completion you will be able to:

- Program statistical analyses using the R programming language.
- Generate data visualisations and publication-quality summary figures using the R programming language.
- Design experiments and apply appropriate statistical methods to test hypotheses in the cognitive and brain sciences.
- Interpret and critically evaluate the results of statistical analyses.

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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

Delivery

Lectures are 1-hour sessions held once per week, starting in Week 1. Lectures run from 9:00 AM - 10:00 AM Mondays and will be delivered live over Zoom.

Readings

The primary reading source for this course are the weekly lecture notes, which will be made available via the course iLearn page. Any supplimental reading will be linked in the lecture notes.

iLearn

Through iLearn you will be able to access the lecture recordings (Echo360), readings, and feedback and marks for the assessment tasks. You are also required to submit all assignments via iLearn, using the Turnitin submission tool. You will need access to the internet to access

iLearn.

Mid-term exam

There will be a mid-term exam which will assess all material covered in lectures, weekly problem sets, and tutorial sessions up to the point at which the exam is given. The exam will be given live over Zoom so that you may ask questions and benefit from the questions asked by others in real time. However, you are under no obligation to be logged into the Zoom session. You will have 1 hour from the time the exam is made available to turn it in through the course iLearn page. If you are unable to take the mid-semester exam at the specified time, you must advise the Student Centre via ask.mq.edu.au and must also apply for Special Consideration through ask.mq.edu.au and submit appropriate supporting documents. Original documents need to be presented at the Student Centre. This should be done within five (5) working days from the day of the examination. It should be noted that Macquarie University Policy states: "Pre-booked holidays will not routinely be considered unavoidable absences or commitments by the University". Students deemed eligible for a late mid-semester exam will be notified via email about the time and location of the exam.

Final exam

There will be a final exam which will assess all material covered in lectures, weekly problem sets, and tutorial sessions up to the point at which the exam is given, including material that appeared on the mid-term exam. The time and location for this exam will be timetabled centrally and announced later in the semester. The exam will be given live over Zoom so that you may ask questions and benefit from the questions asked by others in real time. However, you are under no obligation to be logged into the Zoom session. You will have 2 hours from the time the exam is made available to turn it in through the course iLearn page. The timetable will be available in Draft form approximately eight weeks before the commencement of the examinations and in Final form approximately four weeks before the commencement of the examinations (http://students.mq.edu.au/ student_admin/exams/). The only exception to taking the final exam at the designated time is because of documented illness or unavoidable disruption. In these circumstances you may wish to consider applying for special consideration due to disruption to studies. Information about unavoidable disruption and the special consideration process is available at: http://students.mq.edu.au/study/my-study-program/special-consideration. If a Supplementary Examination is granted as a result of the Special Consideration process, the examination will be scheduled after the conclusion of the official examination period. The format of a supplementary examination is at the unit convenor’s discretion and is subject to change from the original final examination. Supplementary Exams are only offered to students who have satisfactorily completed all other assessments for the unit and were unable to sit the final exam because of documented illness or unavoidable disruption. If a Supplementary Exam has been granted, it is the student’s responsibility to ensure they sit the Supplementary Exam on the specified date. You are advised that it is Macquarie University policy not to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, which is the final day of the official examination period.

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
- Grade Appeal Policy
- Complaint Management 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

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 help you improve your marks and take control of your study.

- Getting help with your assignment
- Workshops
- StudyWise

- 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

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

If you are a Global MBA student contact globalmba.support@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.