NSCI7915

Reproducible Scientific Analysis

Session 1, In person-scheduled-weekday, North Ryde 2025

School of Natural Sciences

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General Information

Unit convenor and teaching staff
John Alroy
john.alroy@mq.edu.au

Credit points
10

Prerequisites
Admission to GradDipRes or GradCertRes

Corequisites

Co-badged status

Unit description
This foundation unit has been developed specifically for BPhil/MRes students to provide them with a solid foundation in the philosophy and practice of reproducible scientific analysis. Through a series of tutorials and workshops, students will incrementally build their skills and knowledge of research in the natural sciences. In parallel, students will undertake a small research project through which they apply the very skills they are discussing in tutorial classes. The unit will provide students with experience in formulating hypotheses, designing experiments, compiling and analysing data, and communication of results. The unit provides a recap of statistical analysis and works specifically to provide a strong foundation in ethical research practices.

Learning in this unit enhances student understanding of global challenges identified by the United Nations Sustainable Development Goals (UNSDGs) Quality Education; Industry, Innovation and Infrastructure

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: Formulate testable scientific hypotheses based on a critical evaluation of the scientific literature

ULO2: Collate, maintain and store scientific data after assessing those data for

completeness, adequacy, and quality

ULO3: Implement computer coding strategies to aid in the preparation, analysis, graphical visualisation, and interpretation of scientific data

ULO4: Prepare and present scientific research findings to a professional standard in written, graphical, and oral form

ULO5: Design and conduct a scientific research project in a reproducible and ethical manner

General Assessment Information

Requirements to Pass this Unit

To pass this unit you must achieve a total mark equal to or greater than 50%.

Academic Honesty

Presenting the work of another person as one's own is a serious breach of the University's rules and carries significant penalties. In this unit, we will be checking written work for plagiarism using TURNITIN. Penalties for plagiarism may include a zero mark for the assignment or in more extreme cases, failure of the unit. Plagiarism WILL be noted on your academic record. (link: Academic Integrity Policy)

Late Assessment Submission Penalty

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

In this unit, late submissions will accepted for written work, but:

- All training and inductions **MUST** be completed prior to starting placement work.
- See marking guidance on iLearn or consult the convenor for additional information.

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 contact the convenor prior to submitting a Special Consideration.

Project pre-registration

You will complete a preregistration of your research project and will upload your data and metadata to an online repository. The preregistration will outline the background, aims and methods of your project, and how you will use data to achieve these aims. You should use the feedback received on your pre-registration to improve your project.

Preliminary analyses

You will complete preliminary analyses for your research project. This provides an opportunity to get feedback prior to completing your research project, final project report, and presentation.

Project presentation

You will give a brief but substantial oral presentation to your peers in class on the results of your research project. Slides illustrating your data, methods, and results should be used.

Time on task reflection

Through the session, you will keep a time on task diary. At the end of the session, you will reflect on the time required to perform various tasks, your time management, and identify ways to improve your time management, research planning, and ways to be more efficient in your work.

Project report

You will write up the results of your research project in the form of a standard-length scientific paper. If possible, it should be divided into the usual sections: Introduction, Data, Methods, Results, Discussion, and References sections. It should also include several substantially different kinds of graphs.

Assessment Tasks

Name	Weighting	Hurdle	Due
Project pre-registration	10%	No	Week 7
Preliminary analyses	20%	No	Week 11
Project presentation	20%	No	Week 12
Time on task reflection	5%	No	Week 13
Project Report	45%	No	Week 13

Project pre-registration

Assessment Type [1]: Plan
Indicative Time on Task [2]: 10 hours
Due: **Week 7**

Weighting: **10%**

You will complete a preregistration of your research project and will upload your data and metadata to an online repository. The preregistration will outline the background, aims and methods of your project, and how you will use data to achieve these aims. You should use the feedback received on your pre-registration to improve your project.

On successful completion you will be able to:

- Formulate testable scientific hypotheses based on a critical evaluation of the scientific literature
- Prepare and present scientific research findings to a professional standard in written, graphical, and oral form
- Design and conduct a scientific research project in a reproducible and ethical manner

Preliminary analyses

Assessment Type [1]: Programming Task
Indicative Time on Task [2]: 20 hours
Due: **Week 11**
Weighting: **20%**

You will complete preliminary analyses for your research project. This provides an opportunity to get feedback prior to completing your research project, final project report and presentation.

On successful completion you will be able to:

- Formulate testable scientific hypotheses based on a critical evaluation of the scientific literature
- Collate, maintain and store scientific data after assessing those data for completeness, adequacy, and quality
- Implement computer coding strategies to aid in the preparation, analysis, graphical visualisation, and interpretation of scientific data
- Prepare and present scientific research findings to a professional standard in written, graphical, and oral form
- Design and conduct a scientific research project in a reproducible and ethical manner

Project presentation

Assessment Type [1]: Presentation
Indicative Time on Task [2]: 10 hours
Due: **Week 12**
Weighting: **20%**

You will give an oral presentation to your peers on the results of your research project.

On successful completion you will be able to:

- Prepare and present scientific research findings to a professional standard in written, graphical, and oral form
- Design and conduct a scientific research project in a reproducible and ethical manner

Time on task reflection

Assessment Type [1]: Reflective Writing
Indicative Time on Task [2]: 7 hours
Due: **Week 13**
Weighting: **5%**

Through the session, you will keep a time on task diary. At the end of the session, you will reflect on the time required to perform various tasks, your time management, and identify ways to improve your time management, research planning, and ways to be more efficient in your work.

On successful completion you will be able to:

- Design and conduct a scientific research project in a reproducible and ethical manner

Project Report

Assessment Type [1]: Report
Indicative Time on Task [2]: 28 hours
Due: **Week 13**
Weighting: **45%**

You will write up the results of your research project in the form of a scientific paper.

On successful completion you will be able to:

- Formulate testable scientific hypotheses based on a critical evaluation of the scientific literature
- Collate, maintain and store scientific data after assessing those data for completeness, adequacy, and quality
- Implement computer coding strategies to aid in the preparation, analysis, graphical visualisation, and interpretation of scientific data
- Prepare and present scientific research findings to a professional standard in written, graphical, and oral form
- Design and conduct a scientific research project in a reproducible and ethical manner

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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

To pass this unit you must:

- Achieve a total mark of at least 50%.

Software installation

You will need to install the application RStudio on your computer. Please install it prior to the first lecture. If you require assistance contact the convenor to schedule an appointment.

Workshops

There will be two eight-hour workshops early in the semester. You are very strongly encouraged to attend in person unless you are absolutely unable to do so for logistical reasons. You will need to bring your laptop to these workshops.

Practicals

Practicals will last two hours and will be conducted on campus. You will learn much more if you attend in person so I can work with you more efficiently on a one-to-one basis. Make sure to bring your laptop each week.

iLearn

The primary means of communication for this unit is via iLearn.

Logging in to iLearn

- The iLearn login page is: https://ilearn.mq.edu.au/
- Username: your student number
- Problems? Please contact Student IT Help
- Need extra help due to a disability/health condition? Please visit the Student Services Website : https://students.mq.edu.au/support/wellbeing

Missed workshops and practicals

Please make direct arrangements with the convenor if you are unable to attend individual workshops.

Overall grades

The University grading categories are fail (F <50%), pass (P 50%-64%), credit (CR 65%-74%), distinction (D 75%-84%), and high distinction (HD 85%-100%).

Assignment submission, plagiarism, and artificial intelligence

All written assessments will be submitted through iLearn via a Turnitin link. Your written assignment will be checked for plagiarism using Turnitin. Plagiarism will not be tolerated.

Text, images, presentations, and R code in this unit are not to be prepared in any way and to any degree using artificial intelligence (AI). You will receive no credit for materials prepared with the aid of AI. Based on past experience, you will spend more time debugging AI-generated R code than you would have spent simply by following the instructions and writing it yourself.

Do not under any circumstances lend your work to another student. If that student plagiarises your work, you too may be liable. The penalties imposed by the University for plagiarism are serious and may include expulsion from the University.

A full outline of the University's policy on plagiarism is found at http://www.mq.edu.au/policy/docs/academic_honesty/policy.html.

Resources and support

How to find the answers:

1. Please read the unit outline.

2. Write directly to the convenor or arrange in an-person meeting.

3. Consult iLearn - your question may have already been asked and answered by another student.

4. If and only if the answer to a question will benefit others, please post it on iLearn.

5. Unexpected adjustments made during the unit will announced via announcements so make sure you check iLearn regularly.

E-mail

Always submit questions to john.alroy@mq.edu.au. Please be courteous and patient - I will

endeavour to reply to your email within 24 hours.

Text book

There are no required textbooks for the unit, but a variety of resources will be posted on iLearn.

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 connect.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/

Academic Success

Academic Success 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 the Service Connect Portal, 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

The schedule for lectures has been revised.

Unit information based on version 2025.03 of the Handbook