



NSCI7915

Reproducible Scientific Analysis

Session 1, In person-scheduled-weekday, North Ryde 2024

School of Natural Sciences

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General Information

Unit convenor and teaching staff

Convenor

John Alroy

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Contact via 9850 8185

EAR14 376

Credit points

10

Prerequisites

Admission to MRes

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.

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

Assessment Tasks

| Name | Weighting | Hurdle | Due |
|--|-----------|--------|---------|
| Project pre-registration | 10% | No | Week 5 |
| Preliminary analyses | 20% | No | Week 9 |
| Project presentation | 15% | No | Week 12 |
| Time on task reflection | 5% | No | Week 13 |
| Project Report | 50% | No | Week 13 |

Project pre-registration

Assessment Type ¹: Plan

Indicative Time on Task ²: 10 hours

Due: **Week 5**

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 9**

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: **15%**

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: **50%**

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

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%.

Drop-in session prior to start of semester

THIS UNIT REQUIRES THAT YOU HAVE ACCESS TO A LAPTOP COMPUTER. To undertake the assessments in this unit and participate in workshops and practicals, you will need to install a variety of software packages on your computer, including R Studio and LaTeX. A detailed how-to guide on how to install the required software will be announced via email the Monday prior to the start of semester. An on-campus drop-in session will also be offered on the Friday prior to the start of semester (time and location TBD) if you experience difficulties with software installation. If you require assistance, but are unable to come to campus, you should contact the convenor to schedule an online appointment via Zoom.

Workshops

Weeks 1 and 2 will consist of two 8-hour workshops. You can participate in these workshops either in person or online over Zoom. However, you are strongly encouraged to attend in person unless you are absolutely unable to do so for logistical reasons. Recordings of workshops will also be made available on iLearn. You will need to bring your laptop to these workshops.

Practicals

Practicals will last 2 hours and will be conducted on campus and online via Zoom. Recordings of practicals will also be made available on iLearn. 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, which can be accessed by most web browsers from inside or outside the University. We expect you to use iLearn for:

- Regularly checking announcements

- Discussing the unit and its content with staff and other students
- Downloading workshop and practical materials
- Downloading reference materials

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

Workshops and practicals will be recorded, but attendance is very highly recommended (see above).

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

This is a paperless unit, so 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.

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. Consult iLearn - often your question has already been asked and answered by another student.
3. If the answer to a question will benefit others, please post it on iLearn.
4. Unexpected adjustments made during the unit will be announced via announcements so make sure you check iLearn regularly.

EMAIL PROTOCOL

1. Always submit questions to john.alroy@mq.edu.au
2. 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 \(https://policies.mq.edu.au\)](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 \(https://students.mq.edu.au/support/study/policies\)](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 \(https://policies.mq.edu.au\)](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.

Unit information based on version 2024.05 of the [Handbook](#)