FOSX1025

Scientific Computing

Session 1, Online-flexible 2025

Science and Engineering Faculty level units

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General Information

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Credit points
10

Prerequisites

Corequisites

Co-badged status
FOSE1025

Unit description
This unit introduces essential concepts and techniques of computing for conducting science, with special emphasis on the preparation and manipulation of data. We discuss the role of computers and computing tools in science and focus on the use of spreadsheets and other data manipulation tools.

Learning in this unit enhances student understanding of global challenges identified by the United Nations Sustainable Development Goals (UNSDGs) 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: Demonstrate foundational knowledge of the role of data, computing and computing tools for science.

ULO2: Determine the appropriate computing tool to manipulate, summarise, and visualise data.

ULO3: Prepare and clean data so that it can be used to address questions in science and industry.

ULO4: Apply computer scripting languages to the preparation and processing of data to enhance reproducibility in science.

ULO5: Explain the ethical implications of the use of computers for gathering, processing, and storing data.

ULO6: Interrogate data to address a topic of current interest to science and society.

General Assessment Information

Requirement to Pass this Unit

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

Assessment Availability Dates

- Assessment 1: Online Session, Week 4
- Assessment 2: Friday, Week 4
- Assessment 3: Friday, Week 8

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 assessments, please apply for Special Consideration.

Assignments where Late Submissions will be accepted:

- Assignment #1 **No**, Standard Late Penalty applies.
- Assignment #2: **Yes**, Standard Late Penalty applies.

- Assignment #3: **Yes**, Standard Late Penalty applies.

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 Service Connect.

Assessment Tasks

Name	Weighting	Hurdle	Due	Groupwork/Individual	Short Extension	AI Approach
Diagnostic Test	10%	No	Week 4, online session		No	
Data Preparation and Manipulation	40%	No	11/04/2025		No	
Reproducibility Project	50%	No	30/05/2025		No	

Diagnostic Test

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 10 hours
Due: **Week 4, online session**
Weighting: **10%**
Groupwork/Individual:
Short extension [3]: No
AI Approach:

Testing the basic knowledge of Scientific Computing and the role of data and tools.

On successful completion you will be able to:

- Demonstrate foundational knowledge of the role of data, computing and computing tools for science.
- Determine the appropriate computing tool to manipulate, summarise, and visualise data.

Data Preparation and Manipulation

Assessment Type [1]: Media presentation

Indicative Time on Task [2]: 35 hours
Due: **11/04/2025**
Weighting: **40%**
Groupwork/Individual:
Short extension [3]: No
AI Approach:

Clean and prepare data for scientific questions using appropriate tools. Explain and demonstrate understanding in a video presentation.

On successful completion you will be able to:

- Determine the appropriate computing tool to manipulate, summarise, and visualise data.
- Prepare and clean data so that it can be used to address questions in science and industry.
- Interrogate data to address a topic of current interest to science and society.

Reproducibility Project

Assessment Type [1]: Project
Indicative Time on Task [2]: 40 hours
Due: **30/05/2025**
Weighting: **50%**
Groupwork/Individual:
Short extension [3]: No
AI Approach:

Given a dataset and a specific question, clean and process data, analyze the results, and thoroughly document the steps to ensure reproducibility.

On successful completion you will be able to:

- Apply computer scripting languages to the preparation and processing of data to enhance reproducibility in science.
- Explain the ethical implications of the use of computers for gathering, processing, and storing data.
- Interrogate data to address a topic of current interest to science and society.

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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
- Academic Success 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.

[3] An automatic short extension is available for some assessments. Apply through the Service Connect Portal.

Delivery and Resources

Classes

Each week includes a two-hour online lecture, a self-passed practical class, and an online consultation class. All classes start in **week 1**.

Methods of Communication

We will communicate with you via your university email or through announcements in iLearn. Questions to staff can either be placed on the iLearn discussion board or sent to the unit convenor from your university email address.

Textbooks and Reading

This unit does not require a textbook. Each week, review the assigned supporting materials, which will be accessible through iLearn.

Software

The unit will use the following software:

- Microsoft Excel
- RStudio

Unit Schedule

Week	Topic
1	+ Computing in Science + Introduction to MS Excel Online + Introduction to R
2	+ Basic Concepts of Computing + Reproducibility
3	+ Variables and Data Types + Data Exploration

4	+ Data Preparation in MS Excel
5	+ Data Preparation in R: Part 1
6	+ Data Preparation in R: Part 2
7	+ Data Processing in MS Excel
	RECESS
8	+ Data Processing in R
9	+ Data Presentation in MS Excel
10	+ Data Presentation in R
11	+ Ethics + ChatGPT
12	+ Presenting and Reporting
13	+ Review

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

To enable students more time to focus on learning, understanding and reflecting on the content of our unit we have revised the assessment structure as follows. There are now only three assessment task. Although no marks are associated with online attendance, all activities provide you with key content designed to help you understand content and complete the assessments.

Changes since First Published

Date	Description
14/02/2025	Changed date format as requested.

Unit information based on version 2025.05 of the Handbook