FOSE1025

Scientific Computing

Session 1, In person-scheduled-weekday, North Ryde 2026

Science and Engineering Faculty level units

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General Information

Unit convenor and teaching staff
Lecturer
Connor Smith
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Contact via email
12WW 617
See iLearn for consultation hours

Credit points
10

Prerequisites

Corequisites

Co-badged status

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.

This unit is specifically designed for students undertaking majors in Biology, Biotechnology, Chemistry, Human Biology, Earth and Environmental Sciences, and Physiological Sciences.

Students enrolling in Astronomy, Physics, Mathematics or Statistical Data Science majors **must** enrol in FOSE1030, **NOT** FOSE1025.

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

Requirements to Pass this Unit:

To pass this unit, you must:

1. Achieve a total mark equal to or greater than 50%

There are no hurdle assessments for this unit.

We strongly encourage all students to actively participate in all learning activities. Regular engagement is crucial for your success in this unit, as these activities provide opportunities to deepen your understanding of the material, collaborate with peers, and receive valuable feedback from instructors, to assist in completing the unit assessments. Your active participation not only enhances your own learning experience but also contributes to a vibrant and dynamic learning environment for everyone.

Late Assessment Submission Penalty:

- **5% penalty per day:** If you submit your assessment late, **5% of the total possible marks** will be deducted for each day (including weekends), up to 7 days.
    - *Example 1 (out of 100):* If you score 85/100 but submit 20 hours late, you will lose 5 marks and receive **80/100**.
    - *Example 2 (out of 30):* If you score 27/30 but submit 1 day late, you will lose 1.5 marks and receive **25.5/30**.
- **After 7 days:** Submissions more than 7 days late will receive a **mark of 0**.
- **Extensions:**
    - **Automatic short extension**: Some assessments are eligible for automatic short extension. You can only apply for an automatic short extension before the due date.

- **Special Consideration**: If you need more time due to serious issues and for any assessments that are not eligible for Short Extension, you must apply for Special Consideration.

Need help? Review the Special Consideration page HERE

Assessments where Late Submissions will be accepted.

1. Diagnostic Test – NO, unless Special Consideration is granted
2. Data Preparation and Manipulation – YES, Standard Late Penalty applies
3. Reproducibility Project – YES, Standard Late Penalty applies

Special Considerations:

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 https://connect.mq.edu.au.

Assessment Tasks

Name	Weighting	Hurdle	Due	Groupwork/Individual	Short Extension	AI Approach
Diagnostic Test	10%	No	22/ 03/ 2026	Individual	Yes	Observed
Data Preparation and Manipulation	40%	No	08/ 05/ 2026	Individual	Yes	Open
Reproducibility Project	50%	No	05/ 06/ 2026	Individual	Yes	Open

Diagnostic Test

Assessment Type [1]: Examination
Indicative Time on Task [2]: 10 hours
Due: **22/03/2026**
Weighting: **10%**
Groupwork/Individual: Individual
Short extension [3]: Yes
AI Approach: Observed

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]: Presentation task
Indicative Time on Task [2]: 35 hours
Due: **08/05/2026**
Weighting: **40%**
Groupwork/Individual: Individual
Short extension [3]: Yes
AI Approach: Open

Clean and prepare data for scientific questions using appropiate tools. Explain and demonstrate the 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]: Portfolio
Indicative Time on Task [2]: 40 hours
Due: **05/06/2026**
Weighting: **50%**
Groupwork/Individual: Individual
Short extension [3]: Yes
AI Approach: Open

Given a dataset and a specific question, clean and process the 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.

[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

Students should enrol in and attend the following classes each week:

- 1 x 120-minute lecture beginning in **Week 1**
- 1 x 120-minute SGTA beginning in **Week 2**

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

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

Method of Communication

We will communicate with you via your university email or through announcements on iLearn. Instructions for seeking assistance can be located on the FOSE1025 iLearn page in a dedicated section.

Recommended Textbooks

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

Technology Used and Required

All unit material is delivered through iLearn. The link may be found at http://ilearn.mq.edu.au. This unit will use the following software:

- Microsoft Excel
- R and RStudio

Unit Schedule

Week	Lecture Topic
1	Computing in Science

2	Basic Concepts in Computing
3	Data Cleaning and Manipulation in Excel
4	Data Analysis and Formulas in Excel
5	Data Visualisation in Excel
6	Advanced Excel Techniques and Data Preparation Workflows
7	Introduction to R and RStudio
8	Data Preparation in R
9	Data Processing in R
10	Data Presentation in R
11	Ethics and AI use
12	Presenting and Reporting
13	Revision week

The topics listed above cover all material addressed in this unit. The order in which this information is presented in lectures may not match the above list.

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.

- Ask a Study Coach
- 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 https://students.mq.edu.au/support/technology/service-desk.

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

Taking on feedback from previous students, this unit will undergo a significant change in lecture slides, notes, and SGTA material. The underlying topics and concepts within the unit remain the same as the last offering.

We value student feedback to be able to continually improve the way we offer our units. As such we encourage students to provide constructive feedback via student surveys, to the teaching staff directly, or via the FSE Student Experience & Feedback link in the iLearn page. We will continue to strive to improve the level of support and the level of student engagement.

Changes since First Published

Date	Description
22/03/2026	Date format updated

Unit information based on version 2026.03 of the Handbook