



FOSE1025

Scientific Computing

Session 2, Fully online/virtual 2020

Science and Engineering Faculty level units

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Notice

As part of [Phase 3 of our return to campus plan](#), most units will now run tutorials, seminars and other small group learning activities on campus for the second half-year, while keeping an online version available for those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face and online 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

Convenor, Lecturer

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Credit points

10

Prerequisites

Corequisites

Co-badged status

FOSX1025

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 introduces vital skills for tertiary learning and explores their relationship to success in future careers.

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 for the key stages of data manipulation.

ULO3: Prepare and clean data so that it can be processed by computer tools.

ULO4: Communicate the steps performed in the preparation and processing of data so that they can be reproduced.

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

ULO6: Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

General Assessment Information

This unit does not have a final exam. Instead, there will be in-class tests during several weeks.

Participation in class is a hurdle without an assessment weight. This means that you must engage in the activities of lectures, tutorials, and workshops, in order to pass the unit.

The **foundation activities** are a hurdle without an assessment weight. This means that these activities are not graded but you must complete them as outlined in order to pass this unit. This unit has been designed so that 20% of student workload is allocated to these activities. Some activities will be automatically graded, but all will ask you to apply the modules to your work in this unit, general university studies and your personal goals. You will be informed of any due dates, but most modules can be completed in your own time. See your iLearn unit for detailed information on how to complete these modules.

There will be 4 **in-class tests** at the weeks specified in the table.

The **project and portfolio** is based on an individual project where you will apply some of the skills learnt during the unit on a practical problem.

In the **reproducibility project** is a two-stage project where you will write a report (stage 1) and then you will assess the reproducibility of someone else's report (stage 2).

No extensions will be granted without an approved application for Special Consideration. There will be a deduction of 10% of the total available marks made from the total awarded mark for each 24 hour period or part thereof that the submission is late. For example, 25 hours late in submission for an assignment worth 10 marks – 20% penalty or 2 marks deducted from the total. No submission will be accepted after solutions have been posted.

Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Participation in class</u>	0%	Yes	During the semester

Name	Weighting	Hurdle	Due
Foundation activities	0%	Yes	During the semester
In-class tests	60%	No	Weeks 3, 6, 9, 12
Project and portfolio	30%	No	Week 9
Reproducibility Project	10%	No	Weeks 10 and 12

Participation in class

Assessment Type ¹: Participatory task

Indicative Time on Task ²: 0 hours

Due: **During the semester**

Weighting: **0%**

This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)

Attendance and participation in lectures, tutorials, and workshops

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 for the key stages of data manipulation.
- Prepare and clean data so that it can be processed by computer tools.
- Communicate the steps performed in the preparation and processing of data so that they can be reproduced.
- Explain the ethical implications of the use of computers for gathering, processing, and storing data.
- Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

Foundation activities

Assessment Type ¹: Participatory task

Indicative Time on Task ²: 0 hours

Due: **During the semester**

Weighting: **0%**

This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)

Activities related to foundational employability and self-directed learning skills

On successful completion you will be able to:

- Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

In-class tests

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 20 hours

Due: **Weeks 3, 6, 9, 12**

Weighting: **60%**

4 in-class tests, one for each principal module of the unit.

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 for the key stages of data manipulation.
- Prepare and clean data so that it can be processed by computer tools.
- Communicate the steps performed in the preparation and processing of data so that they can be reproduced.
- Explain the ethical implications of the use of computers for gathering, processing, and storing data.
- Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

Project and portfolio

Assessment Type ¹: Project

Indicative Time on Task ²: 50 hours

Due: **Week 9**

Weighting: **30%**

A scientific computing project that will be completed in several stages along the course.

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 for the key stages of data manipulation.
- Prepare and clean data so that it can be processed by computer tools.
- Communicate the steps performed in the preparation and processing of data so that they can be reproduced.
- Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

Reproducibility Project

Assessment Type ¹: Project

Indicative Time on Task ²: 15 hours

Due: **Weeks 10 and 12**

Weighting: **10%**

Peer assessment of the reproducibility of a project

On successful completion you will be able to:

- Determine the appropriate computing tool for the key stages of data manipulation.
- Communicate the steps performed in the preparation and processing of data so that they can be reproduced.
- Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

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

Every week there will be 2 hours of lectures, 1 hour of tutorial and 1 hour of practical work. All the required software will be installed in the computers but you are free to bring your own device and install the software.

Delivery

At the time of writing this unit guide, the plan is:

- **Lectures** will be delivered online.
- **Tutorials and practicals** will be delivered online.
- All **assessment** will be online.

Any changes to this plan will be announced in iLearn.

Software

The unit will use the following software:

- Microsoft Excel.
- MATLAB. Macquarie University has a license for all students.
 - You can find information about how to use MATLAB, and access to an online version, in this link: <https://www.mathworks.com/academia/tah-portal/macquarie-university-916052.html>
 - You can access courses and tutorials about MATLAB here: <https://matlabacademy.mathworks.com/>

Textbooks and Reading

This unit does not have a textbook. Each week we will assign reading material and videos. These will be made available via iLearn.

Unit Schedule

The following weekly schedule is tentative:

1. Computing in Science
2. Basic concepts of computing
3. Data types and data frames
4. Data exploration
5. Storing data
6. Scripts for reproducibility
7. Cleaning data
8. Transforming data

9. Summarising and analysing data
10. Ethics
11. Foundational skills (I)
12. Foundational skills (II)
13. Foundational skills (III)

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). 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](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Students seeking more policy resources can visit the [Student Policy Gateway \(https://students.mq.edu.au/support/study/student-policy-gateway\)](https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/study/getting-started/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.

Changes from Previous Offering

This is the second offering of FOSE1025. The first offering was almost exclusively based on Excel, and MATLAB was only introduced at the end of the course and was not assessed. For this offering, MATLAB will be introduced much earlier in the course and will be assessed.

Assessment Standards

FOSE1025 will be assessed and graded according to the University assessment and grading policies.

The following general standards of achievement will be used to assess each of the assessment tasks with respect to the letter grades.

Grade	Range	Description
HD	85-100	Provides consistent evidence of deep and critical understanding in relation to the learning outcomes. There is substantial originality, insight or creativity in identifying, generating and communicating competing arguments, perspectives or problem solving approaches; critical evaluation of problems, their solutions and their implications; creativity in application as appropriate to the course/program.
D	75-84	Provides evidence of integration and evaluation of critical ideas, principles and theories, distinctive insight and ability in applying relevant skills and concepts in relation to learning outcomes. There is demonstration of frequent originality or creativity in defining and analysing issues or problems and providing solutions; and the use of means of communication appropriate to the course/program and the audience.
CR	65-74	Provides evidence of learning that goes beyond replication of content knowledge or skills relevant to the learning outcomes. There is demonstration of substantial understanding of fundamental concepts in the field of study and the ability to apply these concepts in a variety of contexts; convincing argumentation with appropriate coherent justification; communication of ideas fluently and clearly in terms of the conventions of the course/program.
P	50-64	Provides sufficient evidence of the achievement of learning outcomes. There is demonstration of understanding and application of fundamental concepts of the course/program; routine argumentation with acceptable justification; communication of information and ideas adequately in terms of the conventions of the course/program. The learning attainment is considered satisfactory or adequate or competent or capable in relation to the specified outcomes.
F	0-49	Does not provide evidence of attainment of learning outcomes. There is missing or partial or superficial or faulty understanding and application of the fundamental concepts in the field of study; missing, undeveloped, inappropriate or confusing argumentation; incomplete, confusing or lacking communication of ideas in ways that give little attention to the conventions of the course/program.

Assessment Process

These assessment standards will be used to give a numeric mark to each assessment submission during marking. The final mark for the unit will be calculated by combining the marks for all assessment tasks according to the percentage weightings shown in the assessment summary.