



# FOSX1025

## Scientific Computing

Session 2, Fully online/virtual 2021

*Science and Engineering Faculty level units*

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#### **Disclaimer**

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#### **Session 2 Learning and Teaching Update**

The decision has been made to conduct study online for the remainder of Session 2 for all units WITHOUT mandatory on-campus learning activities. Exams for Session 2 will also be online where possible to do so.

This is due to the extension of the lockdown orders and to provide certainty around arrangements for the remainder of Session 2. We hope to return to campus beyond Session 2 as soon as it is safe and appropriate to do so.

Some classes/teaching activities cannot be moved online and must be taught on campus. You should already know if you are in one of these classes/teaching activities and your unit convenor will provide you with more information via iLearn. If you want to confirm, see the list of [units with mandatory on-campus classes/teaching activities](#).

Visit the [MQ COVID-19 information page](#) for more detail.

## General Information

### Unit convenor and teaching staff

#### Convenor

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By appointment

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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. 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://students.mq.edu.au/important-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 at the weeks listed in the table above.

**Participation in class** is a hurdle without an assessment weight. This means that you must attend the lectures and Small Group Teaching Activity (SGTA) sessions, and engage in their activities, in order to pass the unit. In particular, you must attend and engage in the activities of at least the following:

- 7 SGTA sessions out of a total of 11.
- 7 lectures out of a total of 10.

Each of the **foundation activities** is 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 assessment tasks 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.

The **reproducibility project** is a two-phase project where you will write a report (phase 1) and then you will assess the reproducibility of someone else's report (phase 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
<a href="#">Participation in class</a>	0%	Yes	Every week
<a href="#">Foundation Activities</a>	0%	Yes	Weeks 2, 4, 7, 11, 12, 13
<a href="#">In-class tests</a>	60%	No	Weeks 3, 6, 9, 12
<a href="#">Project</a>	30%	No	Week 11
<a href="#">Reproducibility Project</a>	10%	No	Weeks 12 and 13

### Participation in class

Assessment Type <sup>1</sup>: Participatory task

Indicative Time on Task <sup>2</sup>: 0 hours

Due: **Every week**

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 <sup>1</sup>: Participatory task

Indicative Time on Task <sup>2</sup>: 0 hours

Due: **Weeks 2, 4, 7, 11, 12, 13**

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 <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 20 hours

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

Weighting: **60%**

One in-class quiz for each principal module.

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

Assessment Type <sup>1</sup>: Project

Indicative Time on Task <sup>2</sup>: 50 hours

Due: **Week 11**

Weighting: **30%**

Development of a project in several stages: 1. data preparation, 2. processing, 3. presentation

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 <sup>1</sup>: Project

Indicative Time on Task <sup>2</sup>: 15 hours

Due: **Weeks 12 and 13**

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.

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<sup>1</sup> 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 [Learning Skills Unit](#) for academic skills support.

<sup>2</sup> 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

During most of the weeks, there will be 2 hours of lectures and 2 hours of Small Group Teaching Activities (SGTA). All the required software will be installed in the computers but you are free to bring your own device and install the software.

**There are no lectures from week 11, and no lecture-related SGTA sessions from week 12.** Instead, from week 11 there will be other activities related to improving your employability skills. These activities will be detailed in iLearn.

## Delivery Modes

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

- **Lectures** will be delivered online during the entire semester. Lectures will be recorded in case you cannot attend the lecture.
- **SGTA sessions** will be delivered online. There are no set times for these sessions; you will be able to complete them at your own time within the week.
- All **assessment** will be online.

The online delivery of lectures and online SGTA will be via Macquarie University's Zoom web conferencing system (<https://macquarie.zoom.us/>). You will be able to login using your Macquarie OneID.

Any changes to this plan will be announced in iLearn.

## Software

The unit will use the following software:

- Microsoft Excel Online
  - You can find information about how to access the online version in this link: <https://students.mq.edu.au/support/technology/software/microsoft>.
- 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 and MATLAB
7. Cleaning data
8. Transforming data
9. Summarising and analysing data
10. Ethics and reproducibility
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 \(https://policies.mq.edu.au\)](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](#)
- [Grade Appeal Policy](#)
- [Complaint Management 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](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto: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](http://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 Enquiry Service

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

If you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Equity 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.

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](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

There are no major changes from the previous offering.

## Assessment Standards

FOSX1025 will be assessed and graded according to the University assessment and grading policies.

The following general standards of achievement will be used to design and 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

**Automatic marking:** Some of the assessed tasks will be marked automatically. When this is the case, in order to guarantee the above grading standards, some of the questions will require the standard of the level of D or HD.

**Manual marking:** For the assessed tasks that are not marked automatically, these assessment standards will be used to give a numeric mark to the assessment submission during marking, based on a rubric that will be available at the time of the release of the task.

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. If the final mark is 50 or greater and not all assessment hurdles have passed, the final mark and grade will be 49 FH.