



FOSE1025

Scientific Computing

Session 1, In person-scheduled-weekday, North Ryde 2022

Science and Engineering Faculty level units

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General Information

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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 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 at the weeks listed in the table above.

Participation in class is a hurdle without an assessment weight. This means that you must participate in the lectures and Small Group Teaching Activity (SGTA) sessions, in order to pass the unit. In particular, you must 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 as specified in the assessment tasks table. These tests will take place at the place and time of the SGTA sessions of the corresponding week.

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).

Late submissions will be accepted but will incur a penalty unless there is an approved Special Consideration request. A 12-hour grace period will be given after which the following deductions will be applied to the awarded assessment mark: 12 to 24 hours late = 10% deduction; for each day thereafter, an additional 10% per day or part thereof will be applied until five days beyond the due date. After this time, a mark of zero (0) will be given. For example, an assessment worth 20 marks is due 5 pm on 1 January. Student A submits the assessment at 1 pm, 3 January. The assessment received a mark of 15/20. A 20% deduction is then applied to the mark of 15,

resulting in the loss of three (3) marks. Student A is then awarded a final mark of 12/20.

Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Participation in class</u>	0%	Yes	Every week
<u>Foundation activities</u>	0%	Yes	Weeks 2, 4, 7, 11, 12, 13
<u>In-class tests</u>	60%	No	Weeks 3, 6, 9, 12
<u>Project</u>	30%	No	Week 11
<u>Reproducibility Project</u>	10%	No	Weeks 12, 13

Participation in class

Assessment Type ¹: Participatory task

Indicative Time on Task ²: 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 ¹: Participatory task

Indicative Time on Task ²: 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 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

Assessment Type ¹: Project

Indicative Time on Task ²: 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 ¹: Project

Indicative Time on Task ²: 15 hours

Due: **Weeks 12, 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.

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

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 in campus during the entire semester.
- **SGTA sessions** will be delivered in campus during the entire semester. Please check the timetable for the specific times and types of sessions.
- All **assessment** will be in campus or online, depending on the assessment type:
 - Participation tasks and in-class tests will be in campus, at the place and time of the lectures and SGTA sessions.
 - All other assessment tasks will be online via iLearn.

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: <http://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.smq.edu.au) (<https://policies.smq.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.smq.edu.au/support/study/policies) (<https://students.smq.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.smq.edu.au) (<https://policies.smq.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 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.

Changes from Previous Offering

There are no major changes from the previous offering.

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 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.

Grade	Range	Description
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.

Changes since First Published

Date	Description
08/02/2022	Changed the delivery of online lectures and details of participation tasks.