FOSX1025

Scientific Computing

Session 2, Online-flexible 2024

Science and Engineering Faculty level units

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General Information

Unit convenor and teaching staff
Unit Convenor and Lecturer
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Lecturer
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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

Requirements to Pass this Unit

To pass this unit, you must:

- Pass the hurdle requirements:
    - Undertake and satisfactorily complete all Foundation activities, and
- Achieve a total mark equal to or greater than 50%

Hurdle Requirements

Foundation activities

These activities are built to prepare students to transition to being learners in higher education and then becoming professionals within the science community. Each of the activities is a hurdle without an assessment weight. This means that these activities do not contribute to the unit grade but must be completed as outlined to pass this unit. 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.

Reattempts (up to 2) for any unsuccessful activities will be available to you upon receiving the result and feedback and must be submitted by week 11.

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 tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, please apply for Special Consideration.

Assessments where Late Submissions will be accepted:

- Foundation activities - YES, there is no Late Penalty if submitted by week 11
- SGTA assessed activities - YES, there is no Late Penalty if submitted by week 13

- In-class tests - NO, unless Special Consideration is granted
- Project final submission - YES, Standard Late Penalty applies
- Reproducibility project, phase 1 - NO, unless Special Consideration is granted
- Reproducibility project, phase 2 - NO, unless Special Consideration is granted

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.

Foundation activities: No special consideration since late submissions are allowed until week 11 without late penalties.

SGTA assessed activities: No special consideration since late submissions are allowed until week 13 without late penalties.

All Other Assessments: If you experience circumstances or events that affect your ability to complete the written assessments in this unit on time, please submit a Special Consideration request through ask.mq.edu.au.

Assessment Tasks

Name	Weighting	Hurdle	Due
Foundation Activities	0%	Yes	Weeks 2, 3, 4, 5, 7, 8
SGTA assesed activities	10%	No	Weekly
In-class tests	60%	No	Weeks 3, 6, and 12
Project	20%	No	Week 11
Reproducibility Project	10%	No	Weeks 12 and 13

Foundation Activities

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 0 hours
Due: **Weeks 2, 3, 4, 5, 7, 8**
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.

SGTA assesed activities

Assessment Type [1]: Practice-based task
Indicative Time on Task [2]: 5 hours
Due: **Weekly**
Weighting: **10%**

A number of tasks directly related to the project will be assessed as part of the scheduled SGTA activities

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.

In-class tests

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 20 hours
Due: **Weeks 3, 6, and 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 [1]: Project
Indicative Time on Task [2]: 45 hours
Due: **Week 11**
Weighting: **20%**

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 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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[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

Classes

As a flexible offering, there are **no classes, but make yourself available during the "in-class" tests in weeks 3, 6, and 12 on Friday between** 6-9 PM AEST. However, you can join the lecture live stream on Tuesday from 11:05 AM via echo360 on iLearn commencing in **week 1**. The recording of each lecture will be available a few hours (up to 24 hours) after the lecture. The SGTA tasks

There are no lectures from week 11 and no SGTA tasks in week 13. 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 via live-streaming options and recorded via Echo360 on iLearn.
- **In class-tests** will available on Friday of weeks 3, 6, and 12 between 6-9 PM AEST/ AEDT (Sydney time)
- All other assessment tasks will be take-home tasks done 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 at 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 the online version at https://au.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, check the assigned reading material and videos. These will be made available via iLearn.

Methods of Communication

We will communicate with you via your university email and through announcements on iLearn. Queries can either be placed on the iLearn general forum or the Contact the Teaching Staff dialogue on iLearn.

General Notes

In this unit, you should do the following:

- Engage in lectures by reviewing the lecture recording, taking notes and asking questions.
- Work on your weekly SGTA tasks.
- Complete Foundation Activities and SGTA-assessed Activities within the suggested week.
- Ensure that you complete the in-class tests during the prescribed time window.
- Read appropriate sections of the content materials, add to your notes, and prepare questions for the teaching staff.
- Work on any assessments that have been released.

Lecture notes will be made available each week, but these notes are intended as an outline of the lecture only and are not a substitute for your own notes or the recommended reading list.

COVID Information

For the latest information on the University's response to COVID-19, please refer to the Coronavirus infection page on the Macquarie website: https://www.mq.edu.au/about/coronavirus-faqs. Remember to check this page regularly in case the information and requirements change during the semester. If there are any changes to this unit about COVID, these will be communicated 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). 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/su

pport/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 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 Advocacy provides independent advice on MQ policies, procedures, and processes

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

We value student feedback to be able to improve the way we offer our units continually. We encourage students to provide constructive feedback directly via student surveys, to the teaching staff, or via the FSE Student Experience & Feedback link on the iLearn page.

Student feedback from the previous offering of this unit was very positive overall, with students pleased with the clarity around assessment requirements and the level of support from the teaching staff. As such, there is no change in the delivery of the unit this session. However, we will continue to strive to improve the level of support and student engagement.

Unit information based on version 2024.04 of the Handbook