



# FOSE1005

## Mathematical Concepts for Science

Session 2, In person-scheduled-weekday, North Ryde 2022

*Science and Engineering Faculty level units*

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#### Disclaimer

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## General Information

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Credit points

10

Prerequisites

Corequisites

Co-badged status

FOSE1005/S2/ONL-S-DAY

Unit description

An introduction to the basic quantitative methods and techniques common to much of science. You will learn how to formulate scientific problems using mathematical language, use a range of techniques to analyse and solve these problems, and gain an understanding of how to interpret the solutions. Amongst other topics, this unit will cover rates of change, graphical display and interpretation of mathematical concepts, logarithmic and exponential scales, all in the context of scientific measurement and analysis. In the process, this unit introduces vital skills for tertiary learning and explores their relationship to your 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:** Analyze problems in multiple science disciplines, at foundation level, using mathematical concepts and techniques.

**ULO2:** Communicate mathematical concepts in a variety of ways using formal and informal presentations including the use of graphical methods and appropriate software.

**ULO3:** Identify the mathematical principles underlying basic discipline-specific problems.

**ULO4:** Create and interpret the content of mathematical models relevant to foundation

level science topics.

**ULO5:** Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

## General Assessment Information

**HURDLES:** Attendance at, and reasonable engagement in, Small Group Teaching Activities (SGTA) classes in all first year mathematics and statistics units is **compulsory**. Attendance and reasonable engagement in the class activities in at least 8 out of 11 of the SGTA classes are requirements to pass the unit. This is a hurdle requirement.

**ATTENDANCE and PARTICIPATION:** Please contact the unit convenor as soon as possible if you have difficulty attending and participating in any classes. There may be alternatives available to make up the work. If there are circumstances that mean you will miss a class, you can apply for Special Consideration via [ask.mq.edu.au](https://ask.mq.edu.au).

**ASSIGNMENT SUBMISSION:** Assignment submission will be online through the iLearn page.

Submit assignments online via the appropriate assignment link on the iLearn page. A personalised cover sheet is not required with online submissions. Read the submission statement carefully before accepting it as there are substantial penalties for making a false declaration.

- Assignment submission is via iLearn. You should upload this as a single scanned PDF file.
- Please note the quick guide on how to upload your assignments provided on the iLearn page.
- Please make sure that each page in your uploaded assignment corresponds to only one A4 page (do not upload an A3 page worth of content as an A4 page in landscape). If you are using an app like **ClearScanner**, please make sure that the photos you are using are clear and shadow-free.
- It is your responsibility to make sure your assignment submission is legible.
- If there are technical obstructions to your submitting online, please email us to let us know.

You may submit as often as required prior to the due date/time. Please note that each submission will completely replace any previous submissions. It is in your interests to make frequent submissions of your partially completed work as insurance against technical or other problems near the submission deadline.

### LATE ASSESSMENT SUBMISSION PENALTY — General Policy

From 1 July 2022, Students enrolled in Session based units with written assessments will have the following university standard late penalty applied. Please see <https://students.mq.edu.au/study/assessment-exams/assessments> for more information.

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark) will be applied each day a written assessment is not submitted, up until the 7<sup>th</sup> day (including weekends). After the 7<sup>th</sup> day, a grade of '0' will be awarded even if the assessment is submitted. Submission time for all written assessments is set at **11:55 pm**. A 1-hour grace period is 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, students need to submit an application for [Special Consideration](#).

### Assessments where Late Submissions will be accepted:

In this unit, late submissions will accepted as follows:

- Scheduled **tests** must be undertaken at the time indicated in the Unit Guide/iLearn. These **timed assessments** are the two tests. ***No late submissions are accepted.***
- All **untimed assessments** must be submitted by 11:55 pm on their due date. Should these assessments be missed due to illness or misadventure, students should apply for [Special Consideration](#). ***Yes, late submissions are accepted.***
- For the **assignments** and the **vodcast**, a 1-hour grace period will be given after which the following deductions will be applied to the awarded assessment mark: 1 to 24 hours late = 5% deduction; for each day thereafter, an additional 5% per day or part thereof will be applied until seven calendar days beyond the due date. After this time, a mark of zero (0) will be given. For example, an assessment worth 20% is due at 11.55 pm on 1 January. Student A submits the assessment at 1 pm, 4 January. The assessment received a mark of 15/20. A 15% deduction is then applied to the total value of 20, 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
<a href="#"><u>Test 1 (online)</u></a>	20%	Yes	Week 6
<a href="#"><u>Foundation activities</u></a>	0%	Yes	Ongoing: weeks 1–3, 7–9, 12–13
<a href="#"><u>Test 2 (online)</u></a>	20%	No	Week 10
<a href="#"><u>Assignment 1</u></a>	20%	No	Week 7
<a href="#"><u>Assignment 2</u></a>	20%	No	Week 11

Name	Weighting	Hurdle	Due
<u>Vodcast</u>	20%	No	Week 12
<u>Participation in SGTA classes</u>	0%	Yes	Weekly

## Test 1 (online)

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

Indicative Time on Task <sup>2</sup>: 1 hours

Due: **Week 6**

Weighting: **20%**

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

This online quiz will test the ability of the students to represent and interpret scientific data and create and manipulate mathematical information in the form of graphical information, data, and equations.

On successful completion you will be able to:

- Analyze problems in multiple science disciplines, at foundation level, using mathematical concepts and techniques.
- Communicate mathematical concepts in a variety of ways using formal and informal presentations including the use of graphical methods and appropriate software.
- Identify the mathematical principles underlying basic discipline-specific problems.
- Create and interpret the content of mathematical models relevant to foundation level science topics.
- 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: **Ongoing: weeks 1–3, 7–9, 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.

## Test 2 (online)

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

Indicative Time on Task <sup>2</sup>: 1 hours

Due: **Week 10**

Weighting: **20%**

This online quiz will test the ability of the students to recognize, use, and manipulate a variety of mathematical functions, including the use of the derivative and the integral, in the context of discipline-specific problems.

On successful completion you will be able to:

- Analyze problems in multiple science disciplines, at foundation level, using mathematical concepts and techniques.
- Communicate mathematical concepts in a variety of ways using formal and informal presentations including the use of graphical methods and appropriate software.
- Identify the mathematical principles underlying basic discipline-specific problems.
- Create and interpret the content of mathematical models relevant to foundation level science topics.
- Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

## Assignment 1

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 6 hours

Due: **Week 7**

Weighting: **20%**

Problems are chosen to explore mathematical concepts and techniques pertaining to the mathematical content of discipline specific material. Students are expected to demonstrate logical mathematical arguments and submit clearly written solutions.

On successful completion you will be able to:

- Analyze problems in multiple science disciplines, at foundation level, using mathematical concepts and techniques.
- Communicate mathematical concepts in a variety of ways using formal and informal presentations including the use of graphical methods and appropriate software.
- Identify the mathematical principles underlying basic discipline-specific problems.
- Create and interpret the content of mathematical models relevant to foundation level science topics.
- Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

## Assignment 2

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 6 hours

Due: **Week 11**

Weighting: **20%**

Problems are chosen to explore mathematical concepts and techniques pertaining to the mathematical content of discipline specific material. Students are expected to demonstrate logical mathematical arguments and submit clearly written solutions.

On successful completion you will be able to:

- Analyze problems in multiple science disciplines, at foundation level, using mathematical concepts and techniques.
- Communicate mathematical concepts in a variety of ways using formal and informal presentations including the use of graphical methods and appropriate software.
- Identify the mathematical principles underlying basic discipline-specific problems.
- Create and interpret the content of mathematical models relevant to foundation level science topics.
- Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

## Vodcast

Assessment Type <sup>1</sup>: Media presentation

Indicative Time on Task <sup>2</sup>: 5 hours

Due: **Week 12**

Weighting: **20%**

A 3 to 5 minute vodcast prepared in a group of 3 to 4 students, presenting a mathematical model utilizing the content taught in the unit.

On successful completion you will be able to:

- Analyze problems in multiple science disciplines, at foundation level, using mathematical concepts and techniques.
- Communicate mathematical concepts in a variety of ways using formal and informal presentations including the use of graphical methods and appropriate software.
- Identify the mathematical principles underlying basic discipline-specific problems.
- Create and interpret the content of mathematical models relevant to foundation level science topics.
- Demonstrate foundational employability and self-directed learning skills, including recording academic achievements to link university study to future careers.

## Participation in SGTA classes

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

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

Due: **Weekly**

Weighting: **0%**

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

Students are expected to demonstrate their ability to engage with the unit by participating in SGTA classes.

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.

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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 [Writing Centre](#) 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

The unit's iLearn site has modules containing links to descriptions and explanations of all the required tasks; in particular the Employability modules. Weekly sections will contain links to SGTA exercises, and solutions after the due dates/times. Also links to lecture slides and the Echo recordings of lectures will be added to these weekly sections.

From time-to-time further links may be added to other materials deemed relevant to the lecture content, or alternative explanations or descriptions, including online software that can be used for calculations, graphical presentations, etc.

## Unit Schedule

Week	Lecture topic
1	Computation and Measurement
2	Equations, symbolic representation and manipulation
3	Displaying data and interpreting graphs
4	Oscillatory behaviour
5	Growth and decay
6	Rates of change: use and interpretation
7	Calculation of rates of change
Mid Session Break	
8	Optimization
9	Accumulation of change
10	Fundamental Theorem of Calculus: connecting rates of change and accumulated change
11	Employability
12	Employability
13	Employability

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#) (<https://policycentral.mq.edu.au/>)

[s.mq.edu.au](https://www.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 \(https://students.mq.edu.au/support/study/policies\)](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](https://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto: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 <https://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/](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

Test 2 is no longer a hurdle.

The weekly assessments of Lecture Activity Quizzes have been removed.