



FOSE1005

Mathematical Concepts for Science

Session 1, Fully online/virtual 2021

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 activities on campus, and most will keep an online version available to those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face 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

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Credit points

10

Prerequisites

Corequisites

Co-badged status

Unit description

*This unit has an online offering for S2 which is **synchronous**, meaning there will be set times to attend online lectures and tutorials.*

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://students.mq.edu.au/important-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.

Assessment Tasks

Name	Weighting	Hurdle	Due
Foundation activities	0%	Yes	Weekly
Participation in SGTA classes	0%	Yes	Weekly
Lecture activities	0%	Yes	Weekly
Test 1 (online)	20%	Yes	Week 6
Assignment 1	20%	No	Week 7
Test 2 (online)	20%	Yes	Week 10
Assignment 2	20%	No	Week 11
Vodcast	20%	No	Week 12

Foundation activities

Assessment Type ¹: Participatory task

Indicative Time on Task ²: 0 hours

Due: **Weekly**

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.

Participation in SGTA classes

Assessment Type ¹: Participatory task

Indicative Time on Task ²: 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.

Lecture activities

Assessment Type ¹: Participatory task

Indicative Time on Task ²: 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 lecture activities.

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 1 (online)

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 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.

Assignment 1

Assessment Type ¹: Problem set

Indicative Time on Task ²: 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.

Test 2 (online)

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 1 hours

Due: **Week 10**

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 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 2

Assessment Type ¹: Problem set

Indicative Time on Task ²: 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 ¹: Media presentation

Indicative Time on Task ²: 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.

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 [Learning Skills Unit](#) 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

Delivery

One 2 hour lecture per week.

One 2 hour Small Group Teaching Activity (SGTA) per week.

Resources

No single book covers the content of FOSE1005 precisely. Each of the following books contains material useful and relevant to the unit.

Recommended books

1. [Mathematics for Sustainability](#) (free download from Macquarie University internet connection) The book's [website](#).
2. [Maths for Chemists](#)
3. [Active Prelude to Calculus](#) by Boelkins. Extensive videos [here](#).
4. [Active Calculus](#) by Boelkins et al
5. [Modeling Life](#) by Garfinkel et al (free download from Macquarie University internet connection)
6. [MUMS modules](#). Material from the Numeracy Centre.
7. [Precalculus](#) by Stitz and Zeager. See 3rd corrected edition.
8. [Precalculus](#) by Collingwood et al

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 \(https://policies.mq.edu.au\)](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 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 Enquiry Service

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

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/.

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.