FOSE1005
Mathematical Concepts for Science
Session 2, Fully online/virtual 2021
Science and Engineering Faculty level units

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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**  
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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](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**

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Hurdle</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation in SGTA classes</td>
<td>0%</td>
<td>Yes</td>
<td>Weekly</td>
</tr>
<tr>
<td>Foundation activities</td>
<td>0%</td>
<td>Yes</td>
<td>Weekly</td>
</tr>
<tr>
<td>Lecture activities</td>
<td>0%</td>
<td>Yes</td>
<td>Weekly</td>
</tr>
<tr>
<td>Test 1 (online)</td>
<td>20%</td>
<td>Yes</td>
<td>Week 6</td>
</tr>
<tr>
<td>Assignment 1</td>
<td>20%</td>
<td>No</td>
<td>Week 7</td>
</tr>
<tr>
<td>Test 2 (online)</td>
<td>20%</td>
<td>Yes</td>
<td>Week 10</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>20%</td>
<td>No</td>
<td>Week 11</td>
</tr>
<tr>
<td>Voodcast</td>
<td>20%</td>
<td>No</td>
<td>Week 12</td>
</tr>
</tbody>
</table>

**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.
Foundation activities

Assessment Type: Participatory task
Indicative Time on Task: 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.

Lecture activities

Assessment Type: Participatory task
Indicative Time on Task: 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: Quiz/Test
Indicative Time on Task: 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: Problem set
Indicative Time on Task: 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: Quiz/Test  
Indicative Time on Task: 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: Problem set  
Indicative Time on Task: 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.
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**

2. *Maths for Chemists*
3. *Active Prelude to Calculus* by Boelkins. Extensive videos [here](https://www.youtube.com/playlist?list=PLH8z8z8z).
4. *Active Calculus* by Boelkins et al
5. *Modeling Life* by Garfinkel et al (free download from Macquarie University internet connection)
8. *Precalculus* by Collingwood et al

**Unit Schedule**

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Computation and Measurement</td>
</tr>
<tr>
<td>2</td>
<td>Equations, symbolic representation and manipulation</td>
</tr>
<tr>
<td>3</td>
<td>Displaying data and interpreting graphs</td>
</tr>
<tr>
<td>4</td>
<td>Oscillatory behaviour</td>
</tr>
<tr>
<td>5</td>
<td>Growth and decay</td>
</tr>
<tr>
<td>6</td>
<td>Rates of change: use and interpretation</td>
</tr>
<tr>
<td>7</td>
<td>Calculation of rates of change</td>
</tr>
</tbody>
</table>

Mid Session Break
Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). 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 (Note: The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.)

Students seeking more policy resources can visit the Student Policy Gateway (https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).

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 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.