# MATH1000

## Introduction to Mathematical Modelling

Session 1, Weekday attendance, North Ryde 2020

*Department of Mathematics and Statistics*

## Contents

# General Information

Unit convenor and teaching staff
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Credit points
10

Prerequisites

Corequisites

Co-badged status

Unit description
This unit is an elementary unit designed for Engineering, Mathematics and Physics students whose mathematics background has not met the recommended standard for students entering these programs. One half of the unit provides an introduction to the ideas and techniques of differentiation and integration which are pervasive in the theoretical and practical models that underpin areas of science, engineering, economics and technology. The other half of the unit develops the algebraic skills and techniques including exponential, logarithmic, and trigonometric functions.

## 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:** Perform calculations, including rates of changes and integrals, of elementary functions used in science and economics (including linear, polynomial, exponential, logarithmic, and trigonometric) and interpret results of these calculations.
**ULO2:** Communicate mathematical concepts, pertaining to foundation level science topics, in a variety of forms including graphically, numerically, in writing and by using equations.
**ULO3:** Apply mathematical reasoning to simple problem solving in the context of elementary algebra and calculus.
**ULO4:** Test mathematical conjectures involving elementary functions.
**ULO5:** Demonstrate foundational learning skills including active engagement in the learning process.
**ULO6:** Create, communicate and interpret the content of mathematical models relevant to foundation level science topics.

# Assessment Tasks

**Coronavirus (COVID-19) Update**

Assessment details are no longer provided here as a result of changes due to the Coronavirus (COVID-19) pandemic.

Students should consult iLearn for revised unit information.

Find out more about the Coronavirus (COVID-19) and potential impacts on staff and students

# 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 10 out of 12 of the SGTA classes are requirements to pass the unit. This is a hurdle requirement.

Midterm test performance - A score of 40% or more on the test is required to pass the hurdle. A score between 30% and 40% entitles you to a resit of the test. If a resit is allowed, the required mark is still 40%, and the mark allocated to the assessment is capped at this mark. (So if a mark of 70% is achieved on the resit, a mark of 40% is awarded.)

**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

**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 Clear Scanner, 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 SUBMISSION OF WORK:** All assessment tasks must be submitted by the official due date and time. In the case of a late submission for a non-timed assessment (e.g. an assignment), if special consideration has NOT been granted, 20% of the earned mark will be deducted for each 24-hour period (or part thereof) that the submission is late for the first 2 days (including weekends and/or public holidays). For example, if an assignment is submitted 25 hours late, its mark will attract a penalty equal to 40% of the earned mark. After 2 days (including weekends and public holidays) a mark of 0% will be awarded. Timed assessment tasks (e.g. tests, examinations) do not fall under these rules.

**FINAL EXAM POLICY:** It is Macquarie University policy not to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, that is, the final day of the official examination period. The only excuse for not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these special circumstances, you may apply for special consideration via ask.mq.edu.au.

If you receive special consideration for the final exam, a supplementary exam will be scheduled in the interval between the regular exam period and the start of the next session. By making a special consideration application for the final exam you are declaring yourself available for a resit during this supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application.

You can check the supplementary exam information page on FSE101 in iLearn (bit.ly/FSESupp)

for dates, and approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

# Delivery and Resources

**Coronavirus (COVID-19) Update**

Any references to on-campus delivery below may no longer be relevant due to COVID-19.

Please check here for updated delivery information: https://ask.mq.edu.au/account/pub/display/unit_status

**Delivery**

Four 1-hour lectures per week. (2 hours in the calculus stream, and 2 hours in the algebra stream). There are no repeat lectures.

One 1-hour Small Group Teaching Activity (SGTA) per week. SGTAs start in week 2. You must attend and participate in at least 10 of the 12 SGTA to pass this unit. This is a hurdle.

**Resources**

No single book covers the content of MATH1000 precisely.  Each of the following books contains material useful and relevant to the unit.

Main textbook (highly recommended but not compulsory)

*Calculus - single & multivariable*, Hughes-Hallett, Gleason & McCallum (7th edition), John Wiley.

See http://www.wileydirect.com.au/buy/calculus-single-multivariable-7th-edition/

The library  allow you to download a significant portion of the book. On the "advanced search" link for multisearch, put in the title "calculus" and the author "hughes-hallett", and it is the first result. (You will see "7 versions of this record exist.") Choosing the seventh edition takes you to where you can obtain online access, and download or view pdfs.

As indicated by the title, the text is predominantly calculus. However, Chapter 1 contains excellent material for the algebra part of the unit, covering exponentials, logarithms, trigonometry, and polynomials. Later sections in the text cover geometric series.

Recommended books

1. Active Prelude to Calculus by Boelkins. Extensive videos here.
2. Active Calculus by Boelkins et al
3. Modeling Life by Garfinkel et al (free download from Macquarie University internet connection)
4. MUMS modules. Material from the Numeracy Centre.
5. Precalculus by Stitz and Zeager. See 3rd corrected edition.
6. Calculus by Strang

# Unit Schedule

### Coronavirus (COVID-19) Update

The unit schedule/topics and any references to on-campus delivery below may no longer be relevant due to COVID-19. Please consult iLearn for latest details, and check here for updated delivery information: https://ask.mq.edu.au/account/pub/display/unit_status

| Week | Algebra | Calculus | Assessment Due |
|---|---|---|---|
| 1 | Notation, Modelling | Lines | |
| 2 | Algebraic Techniques | Functions | |
| 3 | Percentages, Proportionality | Introduction to the derivative | |
| 4 | Quadratics | Derivative: meaning, definition, graphical interpretation | |
| 5 | Exponentials | Derivative: calculation, rules | |
| 6 | Logarithms | Derivative: rules | |
| 7 | Trigonometry | Derivative: second derivative | Midterm Test |
| 8 | Trigonometry | Derivative: sketching, applications | Assignment 1 |
| 9 | Polynomials | Integration: accumulated change, summing | |
| 10 | Polynomials | Integration: definition, signed area, numerical integration | |
| 11 | Inequalities | Integration: Fundamental theorem of calculus, antiderivatives | Assignment 2 |
| 12 | Sequences and Series | Integration: antiderivatives, substitution | |
| 13 | Revision | Revision | Vodcast |

# 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/study/getting-started/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 Services and 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.

## Student Enquiries

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

## 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.