



MATH130

Mathematics IE

S1 Day 2019

Dept of Mathematics and Statistics

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Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

General Information

Unit convenor and teaching staff

Unit Convenor

Christopher Gordon

chris.gordon@mq.edu.au

Contact via email

12 Wally's Walk 618

See iLearn

Lecturer

Jillian Stott

jillian.stott@mq.edu.au

Contact via email

12 Wally's Walk 533

See iLearn

Frank Schoenig

frank.schoenig@mq.edu.au

Credit points

3

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. The unit provides a basic introduction to the ideas and techniques of differentiation and integration which are pervasive in the theoretical models that underpin most areas of science, engineering, economics and technology. The unit also has a strong focus on developing the algebraic skills and techniques commonly associated with the application of these ideas. Students who have not studied mathematics for several years should consult the Numeracy Centre regarding refresher courses.

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:

Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.

Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments at an elementary level especially in the context basic calculus and algebra.

Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.

Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and algebra.

Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.

Be able to work effectively, responsibly and safely in an individual or team context.

Understand the relevance of mathematics to science, and demonstrate the ability to communicate this to a general audience.

At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

General Assessment Information

HURDLES: Attendance at, and reasonable engagement in, Small Group Teaching Activities (SGTA) in all first year mathematics units is compulsory. Participation will be assessed by instructors via rosters and observation of students' work during classes. 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.

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 miss a class, you can apply for a Special Consideration via ask.mq.edu.au.

LATE SUBMISSION OF WORK: All assignments and assessment tasks must be submitted by the official due date and time. No marks will be given for late work unless an extension has been granted following a successful application for Special Consideration. Please contact the unit convenor for advice as soon as you become aware that you may have difficulty meeting any of the assignment deadlines.

FINAL EXAM POLICY: You are advised that 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 the 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.

Assessment Tasks

Name	Weighting	Hurdle	Due
Final examination	50%	No	University Examination Period
Two assignments	40%	No	Week 6 and 12
Midterm test	10%	No	Week 8
SGTA	0%	Yes	Weekly

Final examination

Due: **University Examination Period**

Weighting: **50%**

Two hour closed book exam.

On successful completion you will be able to:

- Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
- Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments at an elementary level especially in the context basic calculus and algebra.
- Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
- Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and

algebra.

- Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.
- Be able to work effectively, responsibly and safely in an individual or team context.
- Understand the relevance of mathematics to science, and demonstrate the ability to communicate this to a general audience.
- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

Two assignments

Due: **Week 6 and 12**

Weighting: **40%**

Two assignments, weighted at 20% each

On successful completion you will be able to:

- Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
- Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments at an elementary level especially in the context basic calculus and algebra.
- Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
- Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and algebra.
- Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.
- Be able to work effectively, responsibly and safely in an individual or team context.
- Understand the relevance of mathematics to science, and demonstrate the ability to communicate this to a general audience.
- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

Midterm test

Due: **Week 8**

Weighting: **10%**

Midterm test during SGTA. Closed Book.

On successful completion you will be able to:

- Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
- Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments at an elementary level especially in the context basic calculus and algebra.
- Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
- Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and algebra.
- Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.
- Understand the relevance of mathematics to science, and demonstrate the ability to communicate this to a general audience.
- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

SGTA

Due: **Weekly**

Weighting: **0%**

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

Attendance at, and reasonable engagement in, Small Group Teaching Activities (SGTA) in all first year mathematics units is compulsory.

Participation will be assessed by instructors via rosters and observation of students' work during classes.

Attendance and reasonable engagement in the class activities in, at least, 10 out of 12 of the classes are requirements to pass the unit. This is a hurdle requirement.

On successful completion you will be able to:

- Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
- Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments at an elementary level especially in the context basic calculus and algebra.

- Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
- Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and algebra.
- Be able to work effectively, responsibly and safely in an individual or team context.
- Understand the relevance of mathematics to science, and demonstrate the ability to communicate this to a general audience.
- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

Delivery and Resources

Required text on calculus topics is

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

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

The textbook is available online for free from the [library](#). On the "advanced search" link for multisearch, put in the title "calculus" and the author "hughes-hallett", and it is the first result. Next, ask to see all editions. Choosing the seventh edition takes you to where you can obtain online access, and download or view pdfs.

As indicated by the name, 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 cover geometric series.

Recommended texts on elementary and algebra topics are

- Free books by Stitz and Zeager at <http://stitz-zeager.com/>
- [Numeracy Centre notes \(MUMS Modules\)](#) on introductory concepts and techniques that are assumed knowledge for MATH130. These notes also cover some of the material in MATH130. Students who have not studied maths for several years, or who did HSC General Mathematics always find these notes helpful.
- *Calculus*, Strang, MIT. Available [here](#).

Classes

Lectures: Four hours per week (2 hours in the calculus stream, and 2 hours in the algebra stream).

Small Group Teaching Activities (SGTA): You must attend and participate in at least 10 of the

12 weekly SGTA classes to pass this unit.

Technology: Students are expected to have access to an internet enabled computer with a web browser and Adobe Reader software. There are computers for student use in the Library, including laptops for loan.

Difficulties with your home computer or internet connection do not constitute a reasonable excuse for lateness of, or failure to submit, assessment tasks.

Unit Schedule

Week	Algebra	Calculus
1	Notation, Modelling & Algebraic Skills	Lines & Linear Models
2	Algebraic Skills, Proportionality	Functions
3	Quadratics	Differential Calculus: Limits, First Principles & Rules
4	Exponential & Logarithmic Functions	Differential Calculus: Rules, Tangents
5	Exponential & Logarithmic Functions	Differential Calculus: Rules, Higher Order Derivatives
6	Trigonometry	Differential Calculus: Curve Sketching
7	Trigonometry	Differential Calculus: Applications of Differential Calculus
8	Trigonometry	Differential Calculus: Exponential, Logarithmic & Trigonometric Functions
9	Polynomials	Differential Calculus: Applications of Differential Calculus
10	Polynomials & Inequalities	Integral Calculus: Upper & lower sums, The Definite Integral
11	Inequalities & Sequences	Integral Calculus: The Fundamental Theorem, Antiderivatives
12	Series	Integral Calculus: Substitution, Applications & Numerical Integration
13	Revision	Revision

Learning and Teaching Activities

Lectures

There will be four one hour lectures per week, where the concepts are introduced, explained and illustrated. During these the content of the unit will be explained and example problems will be solved and applications in other disciplines discussed.

Small Group Teaching Activities

There is a one-hour SGTA class each week. During this time students will discuss problems related to the previous week's lecture content and work through similar problems.

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) (<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.*)

Undergraduate students seeking more policy resources can visit the [Student Policy Gateway](https://students.mq.edu.au/support/study/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) (<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 improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

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.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

- Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
- Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
- Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and

algebra.

- Be able to work effectively, responsibly and safely in an individual or team context.
- Understand the relevance of mathematics to science, and demonstrate the ability to communicate this to a general audience.
- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

Assessment tasks

- Final examination
- Two assignments
- Midterm test
- SGTA

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcomes

- Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
- Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments at an elementary level especially in the context basic calculus and algebra.
- Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
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Assessment task

- Final examination

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcomes

- Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
- Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments at an elementary level especially in the context basic calculus and algebra.
- Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and algebra.
- Understand the relevance of mathematics to science, and demonstrate the ability to communicate this to a general audience.
- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

Assessment tasks

- Final examination
- Midterm test

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
- Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments at an elementary level especially in the context basic calculus and algebra.
- Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
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Assessment tasks

- Final examination
- Two assignments
- Midterm test
- SGTA

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
- Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments at an elementary level especially in the context basic calculus and algebra.
- Be able to apply the principles, concepts, and techniques learned in this unit to solve

practical and abstract problems.

- Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and algebra.
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- Understand the relevance of mathematics to science, and demonstrate the ability to communicate this to a general audience.
- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

Assessment tasks

- Final examination
- Two assignments
- Midterm test
- SGTA

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Develop a good understanding and demonstrate knowledge of the basic concepts of elementary algebra, and calculus in one variable.
- Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
- Demonstrate appropriate interpretation of information communicated in mathematical form. Be able to understand what is being said in mathematical expressions and be able to formulate ideas using mathematical form in the context of introductory calculus and algebra.
- Be able to work effectively, responsibly and safely in an individual or team context.
- Understand the relevance of mathematics to science, and demonstrate the ability to

communicate this to a general audience.

- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

Assessment tasks

- Final examination
- Two assignments
- Midterm test
- SGTA

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- Be able to apply the principles, concepts, and techniques learned in this unit to solve practical and abstract problems.
- Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.
- Be able to work effectively, responsibly and safely in an individual or team context.
- Understand the relevance of mathematics to science, and demonstrate the ability to communicate this to a general audience.
- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

Assessment tasks

- Final examination
- Two assignments
- Midterm test

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should

have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcomes

- Demonstrate the ability to construct logical, clearly presented and justified mathematical arguments at an elementary level especially in the context basic calculus and algebra.
- Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.
- Be able to work effectively, responsibly and safely in an individual or team context.
- Understand the relevance of mathematics to science, and demonstrate the ability to communicate this to a general audience.

Assessment tasks

- Final examination
- Two assignments

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcomes

- Ethical application of mathematical approaches to solving problems and appropriately reference and acknowledge sources in a mathematical context.
- Be able to work effectively, responsibly and safely in an individual or team context.

Assessment task

- Final examination

Changes from Previous Offering

An assessment task of a midterm test has been added, with a weighting of 10%. The final exam weighting has been reduced to 40%.