



# MATH130

## Mathematics IE

S1 Evening 2014

*Mathematics*

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## General Information

Unit convenor and teaching staff

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E7A 304

see iLearn site

Credit points

3

Prerequisites

Corequisites

Co-badged status

Unit description

This unit is the standard entry-level mathematics unit for students who have not had the benefit of a detailed introduction to the calculus that is equivalent to a reasonably high level of the New South Wales HSC Mathematics course. This unit then serves as a prerequisite for further study in mathematics. Taken by itself, it provides the basic mathematical knowledge required by students in other disciplines. Fundamental skills in algebra are developed at the outset and used to study basic topics in mathematics such as trigonometry; indices and logarithms; equations and inequalities; and progressions. The notion of differential and integral calculus is developed to a reasonable level, sufficient for many simple applications in other areas such as commerce, science and technology.

Students should be familiar with certain topics included in the HSC Mathematics course.

Students who have not studied mathematics for several years should consult the Learning Centre for Numeracy Skills 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 on 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.

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.

## Assessment Tasks

Name	Weighting	Due
<u>Five assignments</u>	20%	TBA
<u>Two Tests</u>	20%	TBA
<u>tutorial task</u>	10%	weekly
<u>Final examination</u>	50%	University Examination Period

### Five assignments

Due: **TBA**

Weighting: **20%**

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 on 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.
- 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.

## Two Tests

Due: **TBA**

Weighting: **20%**

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 on 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.
- 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.

## tutorial task

Due: **weekly**

Weighting: **10%**

Simple skills and computation questions on the topics for this weeks tutorial or straightforward review questions from last weeks tutorial.

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 on 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.
- 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.

## Final examination

Due: **University Examination Period**

Weighting: **50%**

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 on 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.
- 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.

## Delivery and Resources

**Recommended textbook:** Hughes-Hallett, Gleason & McCallum. 2013 (6th edition). Calculus - Single & Multivariable. Wiley.

## Classes

**Lectures:** you should attend two hours of each lecture stream each week, making a total of four hours.

**Tutorials:** you should attend one tutorial each week.

**Practical:** you should attend one practical each week.

**Workshops:** available for students wanting to see more examples and ask further questions. Attendance is strongly recommended.

The online notes are intended primarily as a source of reference. These are not intended to be treated as the only source for learning.

The same material is covered in many texts. You could try several of these, adopting one which suits your personal style of learning as an additional resource. For example the following text is available from the CO-OP Bookshop on campus, and are in the reference section of the Library.

- Stewart, Redlin and Watson; *Precalculus: mathematics for calculus*, 5th edition

Other similar texts are available in the Library, and for reference in the Numeracy Centre (C5A 225).

## Additional Notes

- [Calculus notes by C. Cooper](#) (for MATH123 but also relevant to MATH130)
- [Numeracy Centre notes](#) 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.

## Technology Used and Required

Students are expected to have access to an internet enabled computer with a web browser and Adobe Reader software. Several areas of the university provide wireless access for portable computers. There are computers for student use in the Library and in the [Numeracy Centre](#) (C5A 255).

**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	Number Systems and Factorizations.	Functions and graphs.
2	Number Systems and Factorizations.	Lines. The derivative.
3	Trigonometry.	The derivative. Powers, sums. Tangent lines.
4	Trigonometry.	Velocity and acceleration.
5	Exponentials, Logarithms.	Trigonometric derivatives.
6	Exponentials, Logarithms.	Exponential and logarithmic derivatives.
7	Polynomials, Absolute Value.	Differentiation rules.
8	Inequalities.	Differentiation rules..
9	Simultaneous Equations, Matrices.	Maxima, minima, curve sketching.
10	Conic Sections.	Definite integral and antiderivatives.
11	Arithmetic and Geometric Progressions.	Areas
12	Counting.	Motion in a straight line. Average value.
13	Revision	Revision

## Learning and Teaching Activities

### Lectures

4 one hour lectures per week

### Tutorial

1 one hour tutorial per week

## Practical

1 one hour practical class per week (optional)

## Workshop

1 one hour workshop session per week (optional)

## Quizzes

6 compulsory quizzes per semester

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy [http://mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

Assessment Policy <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Grievance Management Policy [http://mq.edu.au/policy/docs/grievance\\_management/policy.html](http://mq.edu.au/policy/docs/grievance_management/policy.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html) *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of 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/support/student\\_conduct/](https://students.mq.edu.au/support/student_conduct/)

## Late Assignments

No extensions will be granted. Students who have not submitted the task prior to the deadline will be awarded a mark of 0 for the task, except for cases in which an application for special consideration is made and approved.

## 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](http://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](http://ask.mq.edu.au)

## IT Help

For help with University computer systems and technology, visit <http://informatics.mq.edu.au/help/>.

When using the University's IT, you must adhere to the [Acceptable Use Policy](#). The policy applies to all who connect to the MQ network including students.

## Graduate Capabilities

### 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 on 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.
- 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.

## Assessment task

- Final examination

## Learning and teaching activity

- 4 one hour lectures per week
- 1 one hour tutorial per week
- 1 one hour practical class per week (optional)
- 6 compulsory quizzes per semester

## 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 on 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.

## Assessment task

- Final examination

## Learning and teaching activity

- 4 one hour lectures per week
- 1 one hour practical class per week (optional)
- 1 one hour workshop session per week (optional)
- 6 compulsory quizzes per semester

## 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 on 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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- 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 tasks

- Five assignments
- Two Tests
- tutorial task

- Final examination

## Learning and teaching activities

- 4 one hour lectures per week
- 1 one hour tutorial per week
- 1 one hour practical class per week (optional)
- 1 one hour workshop session per week (optional)
- 6 compulsory quizzes per semester

## 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 on 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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- 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 tasks

- Five assignments
- Two Tests
- tutorial task

- Final examination

## Learning and teaching activities

- 4 one hour lectures per week
- 1 one hour tutorial per week
- 1 one hour practical class per week (optional)
- 1 one hour workshop session per week (optional)
- 6 compulsory quizzes per semester

## 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.
- 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.

## Assessment tasks

- Five assignments
- Two Tests
- tutorial task
- Final examination

## Learning and teaching activities

- 1 one hour tutorial per week
- 1 one hour practical class per week (optional)

- 6 compulsory quizzes per semester

## 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.
- 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.

### Assessment tasks

- Five assignments
- Two Tests
- tutorial task
- Final examination

### Learning and teaching activities

- 4 one hour lectures per week
- 1 one hour tutorial per week
- 1 one hour practical class per week (optional)
- 1 one hour workshop session per week (optional)

## 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.
- 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.

## Assessment tasks

- Five assignments
- Two Tests
- Final examination

## Learning and teaching activities

- 1 one hour tutorial per week

## 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 on 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.

## Assessment tasks

- Five assignments
- Two Tests
- Final examination

## Learning and teaching activities

- 4 one hour lectures per week
- 1 one hour tutorial per week
- 1 one hour practical class per week (optional)
- 1 one hour workshop session per week (optional)
- 6 compulsory quizzes per semester

## 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

### Learning and teaching activity

- 4 one hour lectures per week
- 1 one hour tutorial per week
- 1 one hour practical class per week (optional)
- 1 one hour workshop session per week (optional)

## Extra Requirements

Satisfactory performance on supervised assessment tasks, such as tests and the final exam, is necessary to pass this unit. If there is a significant difference between a student's marks on supervised assessment tasks and on unsupervised assessment tasks, the scaling of these tasks may be adjusted when determining the final grade, to reflect more appropriately that student's performance on supervised tasks.