



# MATH135

## Mathematics IA

S1 Day 2013

*Mathematics*

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## General Information

Unit convenor and teaching staff

Other Staff

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Credit points

3

Prerequisites

HSC Mathematics Band 4 or HSC Mathematics Extension 1 Band E2 or HSC Mathematics Extension 2 or MATH130

Corequisites

Co-badged status

Unit description

This is the first mainstream mathematics unit. It is essential for students in science and technology, and recommended for students in many other areas who wish to enhance their mathematical skills. Apart from some brief discussion on complex numbers and congruencies, the main topic in the algebra half of this unit concerns linearity and the interplay between algebra and geometry. Plane geometry is first used to motivate the study of systems of linear equations. Algebraic techniques involving matrices and determinants are then developed to study these problems further. The algebraic machinery developed is then used to study geometrical problems in 3-dimensional space. The notion of a limit is developed to a more sophisticated level than in secondary school mathematics, and this is used to study the differential and integral calculus involving functions of one real variable to a far greater depth than before. Some simple numerical techniques on integration are also discussed.

## 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:

Solving problems, including: - formulating a precise mathematical question from a "real world" problem; - identifying and applying appropriate mathematical techniques.

Understanding logical arguments and recognising any gaps or faults in such arguments.

Expressing yourself clearly and logically in writing.

## Assessment Tasks

Name	Weighting	Due
<u>Five assignments</u>	10%	TBA
<u>Two Tests</u>	20%	Weeks 4 and 9.
<u>Tutorial Assessment</u>	10%	Weekly
<u>Final examination</u>	60%	University Examination Period

### Five assignments

Due: **TBA**

Weighting: **10%**

On successful completion you will be able to:

- Solving problems, including: - formulating a precise mathematical question from a "real world" problem; - identifying and applying appropriate mathematical techniques.
- Understanding logical arguments and recognising any gaps or faults in such arguments.
- Expressing yourself clearly and logically in writing.

### Two Tests

Due: **Weeks 4 and 9.**

Weighting: **20%**

Tests to be held within tutorials in week 4 and 9.

On successful completion you will be able to:

- Solving problems, including: - formulating a precise mathematical question from a "real world" problem; - identifying and applying appropriate mathematical techniques.
- Understanding logical arguments and recognising any gaps or faults in such arguments.

- Expressing yourself clearly and logically in writing.

## Tutorial Assessment

Due: **Weekly**

Weighting: **10%**

Each tutorial a total of four problems will be submitted for assessment.

At the beginning of the tutorial, two problems completed before the tutorial will be handed in to the tutor for marking. These two problems will come from the corresponding tutorial problem sheet for that week, and will be indicated as "pre-tutorial problems".

Towards the end of the tutorial, students will be given a mini-quiz consisting of an additional two problems originating from the tutorial sheet.

On successful completion you will be able to:

- Solving problems, including: - formulating a precise mathematical question from a "real world" problem; - identifying and applying appropriate mathematical techniques.
- Understanding logical arguments and recognising any gaps or faults in such arguments.
- Expressing yourself clearly and logically in writing.

## Final examination

Due: **University Examination Period**

Weighting: **60%**

On successful completion you will be able to:

- Solving problems, including: - formulating a precise mathematical question from a "real world" problem; - identifying and applying appropriate mathematical techniques.
- Understanding logical arguments and recognising any gaps or faults in such arguments.
- Expressing yourself clearly and logically in writing.

## Delivery and Resources

### 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.

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

## Required and Recommended Texts and/or Materials

The required text for MATH135 is available for download on

- [First Year Calculus](#) by W.W.L Chen
- [Linear Algebra](#) by W.W.L Chen
- [Miscellaneous Topics in First Year Mathematics](#) by W.W.L Chen

You should download and study these.

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 should try several of these, adopting one which suits your personal style of learning.

More notes on elementary topics are available at:

- [Elementary Mathematics by W.W.L Chen](#)

The following texts are recommended for this unit, and are available from the CO-OP Bookshop on campus, and are in the reference section of the Library.

- Stewart; *Calculus*
- Trim: *Calculus*
- Anton: *Linear Algebra and its Applications*
- David C. Lay; *Linear Algebra and its Applications*,

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

## 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	<a href="#">Review of Trigonometry</a>	Numbers and induction
2	<a href="#">Polynomials and rational functions</a>	Functions
3	<a href="#">Complex numbers</a> and <a href="#">The Complex Plane</a>	Limits
4	<a href="#">de Moivre's Theorem</a>	Continuity
5	<a href="#">Linear equations</a>	Differentiability
6	<a href="#">Matrices and linear equations</a>	Stationary points and curve sketching
7	<a href="#">Applications of linear equations</a>	Applications of the derivative
8	<a href="#">Arithmetic of matrices</a>	Antiderivatives
9	<a href="#">Determinants</a>	Techniques of integration
10	<a href="#">Vectors</a>	Separable differentiable equations
11	<a href="#">Vectors and geometry</a>	Area under a curve and volumes of solids of revolution
12	Combinatorics, binomial theorem	More applications of integration
13	<b>Revision</b>	

## 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://www.mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://www.mq.edu.au/policy/docs/academic_honesty/policy.html)

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

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

Grade Appeal Policy <http://www.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)

Special Consideration Policy [http://www.mq.edu.au/policy/docs/special\\_consideration/policy.html](http://www.mq.edu.au/policy/docs/special_consideration/policy.html)

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of Policy Central.

## Student Support

Macquarie University provides a range of Academic Student Support Services. Details of these services can be accessed at: <http://students.mq.edu.au/support/>

### UniWISE provides:

- Online learning resources and academic skills workshops [http://www.students.mq.edu.au/support/learning\\_skills/](http://www.students.mq.edu.au/support/learning_skills/)
- Personal assistance with your learning & study related questions.
- The Learning Help Desk is located in the Library foyer (level 2).
- Online and on-campus orientation events run by Mentors@Macquarie.

## 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

Details of these services can be accessed at <http://www.student.mq.edu.au/ses/>.

## IT Help

If you wish to receive IT help, we would be glad to assist you at <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 and it outlines what can be done.

## 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

- Solving problems, including: - formulating a precise mathematical question from a "real

world" problem; - identifying and applying appropriate mathematical techniques.

- Understanding logical arguments and recognising any gaps or faults in such arguments.

## Assessment tasks

- Five assignments
- Two Tests
- Tutorial Assessment
- 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

- Solving problems, including: - formulating a precise mathematical question from a "real world" problem; - identifying and applying appropriate mathematical techniques.
- Understanding logical arguments and recognising any gaps or faults in such arguments.

## Assessment tasks

- Five assignments
- Two Tests
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- Final examination

## 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

- Solving problems, including: - formulating a precise mathematical question from a "real



world" problem; - identifying and applying appropriate mathematical techniques.

- Understanding logical arguments and recognising any gaps or faults in such arguments.

## Assessment tasks

- Five assignments
- Two Tests
- Tutorial Assessment
- Final examination

## 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

- Solving problems, including: - formulating a precise mathematical question from a "real world" problem; - identifying and applying appropriate mathematical techniques.
- Understanding logical arguments and recognising any gaps or faults in such arguments.

## Assessment tasks

- Five assignments
- Two Tests
- Tutorial Assessment
- Final examination

## 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

- Solving problems, including: - formulating a precise mathematical question from a "real world" problem; - identifying and applying appropriate mathematical techniques.
- Understanding logical arguments and recognising any gaps or faults in such arguments.

## Assessment tasks

- Five assignments
- Two Tests
- Tutorial Assessment
- Final examination

## 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

- Solving problems, including: - formulating a precise mathematical question from a "real world" problem; - identifying and applying appropriate mathematical techniques.
- Understanding logical arguments and recognising any gaps or faults in such arguments.

## Assessment tasks

- Five assignments
- Two Tests
- Tutorial Assessment
- Final examination

## 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

- Solving problems, including: - formulating a precise mathematical question from a "real world" problem; - identifying and applying appropriate mathematical techniques.
- Understanding logical arguments and recognising any gaps or faults in such arguments.

## Assessment tasks

- Five assignments
- Two Tests

- Tutorial Assessment
- Final examination

## 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

- Solving problems, including: - formulating a precise mathematical question from a "real world" problem; - identifying and applying appropriate mathematical techniques.
- Understanding logical arguments and recognising any gaps or faults in such arguments.

### Assessment tasks

- Five assignments
- Two Tests
- Tutorial Assessment
- Final examination

## 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

- Solving problems, including: - formulating a precise mathematical question from a "real world" problem; - identifying and applying appropriate mathematical techniques.
- Understanding logical arguments and recognising any gaps or faults in such arguments.

### Assessment tasks

- Five assignments
- Two Tests
- Tutorial Assessment
- Final examination

