MATH135

Mathematics IA

S1 Day 2017

Dept of Mathematics

Contents

General Information

Unit convenor and teaching staff
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Credit points
3

Prerequisites
(HSC Mathematics Band 4-6 or Extension 1 Band E2-E4 or Extension 2) or MATH130 or MATH123(HD)

Corequisites

Co-badged status

Unit description
This is the first mainstream university mathematics unit; it is essential for students in engineering and many areas of science. We start with exploring the concept of a function, and continue with the notions of limit and continuity, developed to a reasonably sophisticated level. We then define the concept of derivative as a suitable construct to describe rates of change, develop the differential and integral calculus of functions of a real variable, and discuss some simple differential equations and their role as quantitative models for dynamic processes. We also study the use of vectors in two and three-dimensional Euclidean geometry, and relate this to the algebraic process of solving linear systems in several variables.

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:

By the end of this unit, you should be able to demonstrate a well-developed knowledge of the elementary principles, concepts and techniques of calculus, using a range of relevant algebraic techniques, and understand the behaviour of the standard elementary mathematical functions under these operations.
Demonstrate an understanding of the key concepts of limit and continuity, and be able to compute a wide range of limits.
Demonstrate an understanding of the key concept of derivative as a rate of change, and be able to calculate derivatives for a wide range of functions, using the relevant methods.
Be able to solve a broad range of mathematical problems involving differentiation.
Demonstrate an understanding of the key concept of integral as accumulated change, and be able to calculate integrals of a wide range of functions, using the relevant methods. Be able to solve a broad range of mathematical problems involving integration.
Understanding and constructing elementary mathematical arguments, using the concepts and techniques studied in this unit.
Have a reasonable understanding about the applications of these concepts and techniques in other disciplines, in particular in Physics and Engineering.
Expressing mathematical ideas clearly and logically and provide appropriate justification for your conclusions.

General Assessment Information

HURDLES: This unit has no hurdle requirements. This means that there are no second chance examinations and assessments if you happen to fail at your first attempt. Students should aim to get at least 60% for the course work in order to be reasonably confident of passing the unit.

IMPORTANT: If you apply for Disruption to Study for your final examination, you must make yourself available for the week of July 24 – 28, 2017. If you are not available at that time, there is no guarantee an additional examination time will be offered. Specific examination dates and times will be determined at a later date.

Assessment Tasks

Name	Weighting	Hurdle	Due
Assignments	30%	No	See iLearn
Tutorial work	20%	No	Weekly
Exam	40%	No	End-of-semester
Midterm Test	10%	No	See iLearn

Assignments

Due: **See iLearn**
Weighting: **30%**

Three assignments

On successful completion you will be able to:

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Tutorial work

Due: **Weekly**
Weighting: **20%**

Compulsory weekly two-hour tutorial classes and in tutorial assessment.

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Exam

Due: **End-of-semester**
Weighting: **40%**

Supervised exam

On successful completion you will be able to:

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Midterm Test

Due: **See iLearn**
Weighting: **10%**

A 45 minute test, conducted during tutorial time.

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Delivery and Resources

Delivery: Day, Internal.

Classes: Students are stronlgy encouraged to attend all four lectures each week.

Tutorials: You should attend one tutorial each week. Tutorial classes are compulsory. Students have to attend the tutorial class in which they are enrolled. Any variation to this has to be approved by the convenor.

MATH135 Workshops: available for students wanting to see more examples and ask further questions; organized by the Numeracy Centre. Attendance is strongly recommended.

This unit will use: iLearn. Students need regular access to a reliable internet connection.

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

Unit Schedule

Week	Topic
1	Review of assumed material
2	Functions and Trigonometry
3	Trigonometry
4	Limits and Continuity
5	Differentiation: rates, definition, properties
6	Differentiation: Mean Value Theorem and Implicit
7	Integration: accumulated change, definition, properties
8	Integration: techniques and applications
9	Vectors and Geometry
10	Systems of Linear Equations
11	Differential equations: introduction, separable, Linear first order
12	Binomial Theorem

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.

Tutorial classes

There will be one compulsory two-hour tutorial class per week. During this time students will discuss problems related to the previous week's lecture content and work through similar problems.

MATH135 Workshop

There is a weekly optional workshop provided by the Numeracy Centre.

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

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy_2016.html

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

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy (in effect until Dec 4th, 2017): http://www.mq.edu.au/policy/docs/disruption_studies/policy.html

Special Consideration Policy (in effect from Dec 4th, 2017): https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration

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/

Results

Results shown in *iLearn*, 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.

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

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

- Demonstrate an understanding of the key concepts of limit and continuity, and be able to compute a wide range of limits.
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- Have a reasonable understanding about the applications of these concepts and techniques in other disciplines, in particular in Physics and Engineering.

Assessment tasks

- Assignments
- Tutorial work
- Exam
- Midterm Test

Learning and teaching activities

- 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.
- There will be one compulsory two-hour tutorial class per week. During this time students will discuss problems related to the previous week's lecture content and work through similar problems.
- There is a weekly optional workshop provided by the Numeracy Centre.

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

- Have a reasonable understanding about the applications of these concepts and techniques in other disciplines, in particular in Physics and Engineering.
- Expressing mathematical ideas clearly and logically and provide appropriate justification for your conclusions.

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.

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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.

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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.

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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.

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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:

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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 outcome

- Expressing mathematical ideas clearly and logically and provide appropriate justification for your conclusions.

Assessment tasks

- Assignments
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- Exam
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Learning and teaching activities

- There will be one compulsory two-hour tutorial class per week. During this time students will discuss problems related to the previous week's lecture content and work through similar problems.

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 outcome

- Expressing mathematical ideas clearly and logically and provide appropriate justification for your conclusions.

Assessment tasks

- Assignments

- Tutorial work