MATH130

Mathematics IE

S2 Day 2017

Dept of Mathematics

Contents

Disclaimer

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General Information

Unit convenor and teaching staff
Convenor
Elena Vynogradova
elena.vynogradova@mq.edu.au
Contact via elena.vynogradova@mq.edu.au
12 Wally's Walk (E7A 709)
Thursday 3-4pm or by appointment

Lecturer
Jillian Stott
jillian.stott@mq.edu.au
Contact via jillian.stott@mq.edu.au
E7A
By appointment

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
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 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.

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, and your final grade is determined by adding the marks obtained for your examinations and assessments. 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 <u>must</u> make yourself available for the week of December 11 – 15, 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
Three assignments	30%	No	See iLearn
Tutorial participation	20%	No	Weekly
Final examination	50%	No	University Examination Period

Three assignments

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

Assignments

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.

Tutorial participation

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

Tutorial attendance is recorded and marks awarded for questions reviewing the work covered in the previous tutorial. Only students who attend the whole tutorial session can submit tutorial work and receive marks for the tutorial assessment. The best 8 tutorial marks will contribute to 20% of the grade for the unit.

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.

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.

Delivery and Resources

Required text on calculus topics is

Calculus - single & multivariable, Hughes-Hallett, Gleason & McCallum, 2013 (6th edition), John Wiley. See http://www.wileydirect.com.au/buy/calculus-single-multivariable-6th-edition/

Recommended texts on elementary and algebra topics are

- Free books by Stitz and Zeager at http://stitz-zeager.com/
- 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.
- - *Calculus*, Strang, MIT. Available here.

Classes

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

Tutorials: you should attend one 1 hour tutorial each week.

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

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.

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	Functions
3	Quadratics, Parabolas & Exponentials	Differential Calculus:Limits, First Principles & Rules
4	Exponential & Logarithmic Functions	Differential Calculus:Rules, Tangents, Higher Order Derivatives
5	Trigonometry	Differential Calculus:Curve Sketching
6	Trigonometry	Applications of Differential Calculus
7	Trigonometry	Differential Calculus:Exponential, Logarithmic & Trigonometric Functions
8	Proportions & Percentages	Applications of Differential Calculus

9	Polynomials	Integral Calculus:Upper & lower sums, The Definite Integral
10	Polynomials & Inequalities	Integral Calculus:The Fundamental Theorem, Antiderivatives
11	Inequalities & Sequences	Integral Calculus:Substitution & Applications
12	Series	Integral Calculus:Applications & Numerical Integration
13	Revision	Revision

Learning and Teaching Activities

Lectures

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 one-hour tutorial class per week. The tutorial questions will be available on iLearn by the end of the previous week. Each set of tutorial questions will contain • A preparatory set of questions to be completed before the tutorial to reinforce the basic concepts in the previous weeks lectures. You will be given short answers to these questions at the beginning of the tutorial to allow you to check your own work. • A set of questions that will discussed in the tutorial. Mathematics is best learnt by active participation in solving problems, and you will gain the most benefit from the tutorials by actively participating in the discussion of these problems and asking for clarification of things you do not understand. Your tutor will guide you to ensure that the class develops coherent, well presented answers. • A set of further challenge problems to enable you to further develop your understanding after the tutorial. If time permits, some of these questions may be considered in the tutorial. • One or two homework problems, similar to those discussed in the tutorial, to be handed in at the next tutorial for marking. These are designed to provide you with timely feedback on the development of your skills and understanding. We will use the 8 best marks from the weekly homework to determine the tutorial component of your grade. Your homework will only be marked if you attend and participate in the entire tutorial. The mathematics department considers that using only the best 8 marks is a sufficient remedy for any disruption that may occur to a student. A set of model answers for the tutorial questions will be posted on iLearn at the end of each week. Model answers for the marked homework will be provided on the following week.

Assignments

There will be three assignments in this unit. Assignment questions will be made available on iLearn after the material required to answer them has been covered in lectures and at least two weeks before the due date. While we encourage collaborative learning, these are individual assignments, and the work you submit must be your own work. For your own protection, we

advise all students participating in group study sessions related to assignment questions to ensure that all participants in such groups destroy any notes they have made at the end of such a session. Participants can then independently construct their own solutions based on the understanding and insight provided by the study session without running the risk of breaching the rules relating to academic misconduct.

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.

Late Assignments

Late submissions will not be accepted once solutions have been made available on-line. Submissions after the deadline without an extension having been granted through the disruption process will have 20% of the maximum mark available deducted from the mark awarded.

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

- 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.

Assessment tasks

- Three assignments
- Tutorial participation
- Final examination

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.
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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.

Assessment task

- 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

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

- Three assignments
- Tutorial participation
- 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

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

- Three assignments
- Tutorial participation
- 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

- 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.

Assessment tasks

- Three assignments
- Tutorial participation
- 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

- 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

- Three assignments
- 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

- 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.

Assessment tasks

- Three assignments
- 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

- 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 since First Published

Date	Description
27/07/2017	Amendment to required textbook

Date	Description
05/07/2017	removal of inappropriate staff contact