



MATH123

Mathematics 123

S2 Day 2018

Dept of Mathematics

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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

Convener

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Credit points

3

Prerequisites

Corequisites

Co-badged status

Unit description

This unit introduces students to a range of mathematical techniques from algebra and calculus. Its focus is on the modern application of these ideas, with a particular emphasis on applications to problems in economics, business and finance, and provides a sound mathematical basis for further study in these areas. Topics include algebra relevant to basic financial mathematics, the development of the techniques of differentiation and integration with applications to constrained and unconstrained optimisation, including multivariable cases, and the development and application of a variety of useful approximation techniques. A key focus of the unit is the development of a clear understanding of the role that mathematics plays in modern society, and the development of a sound grasp of how mathematics is used to provide sophisticated modelling of complex real problems.

While the mathematical content of this unit has considerable overlap with the mathematical content of MATH130, the flavour with which the material is presented is such that this unit is the appropriate choice for economics, business and finance students, while students who wish to pursue study in science will be better served by studying MATH130.

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:

Demonstrate a well-developed knowledge of the principles, concepts and techniques of mathematics as they apply to finance, economics, and the sciences.

Demonstrate an understanding of the breadth of mathematics, the multi-disciplinary role of mathematics and the way it contributes to the development in other fields of study.

Construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning.

Formulate and model "real world" problems, including identifying and applying appropriate mathematical techniques.

Apply mathematical principles, concepts, techniques and technology efficiently to solve "real world" problems.

Appropriately interpret mathematical models communicated in a wide range of forms.

Use technology to produce digital media for the purpose of communicating technical concepts.

Demonstrate an understanding of ethical, social and environmental issues relating to professional mathematical work, identify and address issues arising in such professional work and make ethical decisions while collecting and analysing data and reporting

findings.

Work effectively, responsibly and safely in individual and team contexts.

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, tutorials in all first year mathematics units is **compulsory**. Participation will be assessed by tutors via rosters and observation of students' work during classes. Attendance and reasonable engagement in the class activities in at least 8 out of 12 of the tutorial classes are requirements to pass the unit.

IMPORTANT: If you apply for Special Consideration for your final examination, you must make yourself available for the supplementary exam period. If you are not available in this period, there is no guarantee an additional examination time will be offered. Specific examination dates and times will be determined at a later date.

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 Special Consideration.

Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Group work video</u>	10%	No	Week 12
<u>Assignments</u>	30%	No	Weeks 4, 8, 12
<u>Final examination</u>	40%	No	University Examination Period
<u>Tutorial Homework</u>	20%	Yes	Weekly

Group work video

Due: **Week 12**

Weighting: **10%**

Group assignment where a vodcast is created.

On successful completion you will be able to:

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of mathematics and the way it contributes to the development in other fields of study.

- Construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning.
- Formulate and model "real world" problems, including identifying and applying appropriate mathematical techniques.
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- Appropriately interpret mathematical models communicated in a wide range of forms.
- Use technology to produce digital media for the purpose of communicating technical concepts.
- Demonstrate an understanding of ethical, social and environmental issues relating to professional mathematical work, identify and address issues arising in such professional work and make ethical decisions while collecting and analysing data and reporting findings.
- Work effectively, responsibly and safely in individual and team contexts.

Assignments

Due: **Weeks 4, 8, 12**

Weighting: **30%**

Three assignments, each having a weight of 10%.

On successful completion you will be able to:

- Demonstrate a well-developed knowledge of the principles, concepts and techniques of mathematics as they apply to finance, economics, and the sciences.
- Demonstrate an understanding of the breadth of mathematics, the multi-disciplinary role of mathematics and the way it contributes to the development in other fields of study.
- Construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning.
- Apply mathematical principles, concepts, techniques and technology efficiently to solve "real world" problems.
- Appropriately interpret mathematical models communicated in a wide range of forms.
- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

Final examination

Due: **University Examination Period**

Weighting: **40%**

Final examination

On successful completion you will be able to:

- Demonstrate a well-developed knowledge of the principles, concepts and techniques of mathematics as they apply to finance, economics, and the sciences.
- Demonstrate an understanding of the breadth of mathematics, the multi-disciplinary role of mathematics and the way it contributes to the development in other fields of study.
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- Demonstrate an understanding of ethical, social and environmental issues relating to professional mathematical work, identify and address issues arising in such professional work and make ethical decisions while collecting and analysing data and reporting findings.
- Work effectively, responsibly and safely in individual and team contexts.
- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

Tutorial Homework

Due: **Weekly**

Weighting: **20%**

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

Tutorial homework based on the previous tutorial class

On successful completion you will be able to:

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- Construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning.
- Apply mathematical principles, concepts, techniques and technology efficiently to solve "real world" problems.
- Appropriately interpret mathematical models communicated in a wide range of forms.

- 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

Classes

Lectures: you should attend four hours of each lectures each week.

Tutorials: you should attend one tutorial each week (starting in Week 2).

Required and Recommended Texts and/or Materials

The main text for this unit is:

Mavron, et al, *Mathematics for Economics and Finance*, Springer.

It can be found [here](#). The book can be downloaded for free when using an academic internet connection, such as using your student login details at university or from the computers in the library.

There are a variety of texts that cover the content of the unit:

- Jacques, *Mathematics for Economics and Business*, any edition, Pearson. Library call number *HB135 .J32 2015*.
- Bradley, *Essential Mathematics for Economics and Business*, Wiley, 4th edition, 2013. Library call number *HF5691 .B7 2013*.
- Swift, *Quantitative Methods for Business Management and Finance*, Palgrave Macmillan, 4th edition, 2014 Library call number *HD 30.215 .S295 2014*

There are many books in the library with similar content.

The following texts are also useful for this unit, and are available from the CO-OP Bookshop on campus, and are in the Library.

- Stewart, Redlin and Watson; *Precalculus: mathematics for calculus*, any edition
- Hughes-Hallett and Gleason; *Calculus: single and multivariable*, any edition

Additional Notes

- [Numeracy Centre notes](#) on introductory concepts and techniques that are assumed knowledge for MATH123. These notes also cover some of the material in MATH123. Students who have not studied maths for several years, or who did HSC General Mathematics often 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.

In order to complete the group work video assessment task, students will need access to a device capable of recording video and audio, such as a smartphone or computer with a webcam. Students who do not have access to such devices will be assisted in joining a group that does.

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

30/7/2018	Graphs	Numbers	
6/8/2018	The XY plane	Fractions. Factoring. Laws of exponents	
13/8/2018	The derivative: introduction, definition and meaning	Linear equations, word problems, percentages	
20/8/2018	The derivative: rules	Linear systems. Quadratics	
27/8/2018	The derivative: uses in economics	Exponentials and logarithms	A1
3/9/2018	Optimization	Exponentials and logarithms, continued	
10/9/2018	Functions of several variables	Inequalities. Absolute value	
	Mid Semester Break		
1/10/2018	Lagrange Multipliers	Arithmetic and geometric progressions	A2
8/10/2018	Derivatives of Exponentials and logarithms; Newton's Method	Applications of GPs to finance	
15/10/2018	Integration: introduction, meaning, definition, computation, FTC	Matrices	
22/10/2018	Integration: numerical, rules, substitution	Matrices, continued	Vodcast
29/10/2018	Integration: uses in Economics	Revision	A3
5/11/2018	Revision	Study Week	

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

There will be one compulsory one-hour tutorial class per week, starting in Week 2. 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 be 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 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 \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](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>). 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>).

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 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 a well-developed knowledge of the principles, concepts and techniques of mathematics as they apply to finance, economics, and the sciences.
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- Demonstrate an understanding of ethical, social and environmental issues relating to professional mathematical work, identify and address issues arising in such professional work and make ethical decisions while collecting and analysing data and reporting

findings.

- Work effectively, responsibly and safely in individual and team contexts.

Assessment tasks

- Group work video
- Assignments
- Final examination

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 one-hour tutorial class per week, starting in Week 2. 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 be 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 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.
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- 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.

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.

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Learning outcomes

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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

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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.

This graduate capability is supported by:

Learning outcomes

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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.

This graduate capability is supported by:

Learning outcomes

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- Tutorial Homework

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 one-hour tutorial class per week, starting in Week 2. 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 be 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 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.

- 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.

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

- Demonstrate a well-developed knowledge of the principles, concepts and techniques of mathematics as they apply to finance, economics, and the sciences.
- Demonstrate an understanding of the breadth of mathematics, the multi-disciplinary role

- of mathematics and the way it contributes to the development in other fields of study.
- Construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning.
 - Formulate and model "real world" problems, including identifying and applying appropriate mathematical techniques.
 - Apply mathematical principles, concepts, techniques and technology efficiently to solve "real world" problems.
 - Appropriately interpret mathematical models communicated in a wide range of forms.
 - Use technology to produce digital media for the purpose of communicating technical concepts.
 - Demonstrate an understanding of ethical, social and environmental issues relating to professional mathematical work, identify and address issues arising in such professional work and make ethical decisions while collecting and analysing data and reporting findings.
 - Work effectively, responsibly and safely in individual and team contexts.

Assessment tasks

- Group work video
- Assignments
- Final examination

Learning and teaching activities

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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:

Learning outcomes

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- Formulate and model "real world" problems, including identifying and applying

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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.

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- Work effectively, responsibly and safely in individual and team contexts.
- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

Assessment tasks

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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

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Changes from Previous Offering

Tutorials start in Week 2 (in Semester 1, tutorials started in Week 1).