



MATH123

Mathematics 123

S1 Day 2019

Dept of Mathematics and Statistics

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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

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See iLearn

Unit Convenor & Lecturer

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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 it 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, SGTAs in all first year mathematics units is **compulsory**. Participation will be assessed by instructors via rosters and observation of students' work during classes. Attendance and reasonable engagement in the class activities in at least 10 out of 12 of the SGTA classes are requirements to pass the unit..

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.

LATE SUBMISSION OF WORK: All assignments and assessment tasks must be submitted by the official due date and time. No marks will be given for late work unless an extension has been granted following a successful application for Special Consideration. Please contact the unit convenor for advice as soon as you become aware that you may have difficulty meeting any of the assessment deadlines.

FINAL EXAM POLICY: You are advised that it is Macquarie University policy not to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, that is, the final day of the official examination period. The only excuse for not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these special circumstances, you may apply for special consideration via ask.mq.edu.au.

If you receive special consideration for the final exam, a supplementary exam will be scheduled in the interval between the regular exam period and the start of the next session. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. You can check the supplementary exam information page on FSE101 in iLearn (bit.ly/FSESup) for dates, and approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

Assessment Tasks

Name	Weighting	Hurdle	Due
Group work video	10%	No	Week 7, 10

Name	Weighting	Hurdle	Due
<u>Assignments</u>	40%	No	Weeks 7, 12
<u>Final examination</u>	50%	No	University Examination Period
<u>SGTA Participation</u>	0%	Yes	Weekly

Group work video

Due: **Week 7, 10**

Weighting: **10%**

Group assignment where a vodcast is created. You must enrol in a Vodcast group by Week 7.

The Vodcast itself must be completed by Week 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.
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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 7, 12**

Weighting: **40%**

Two assignments, each having a weight of 20%.

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.
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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.
- 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: **50%**

Two hour written 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.
- Construct sustained logical, clearly presented and justified mathematical arguments incorporating deductive reasoning.
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- Apply mathematical principles, concepts, techniques and technology efficiently to solve

"real world" problems.

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

SGTA Participation

Due: **Weekly**

Weighting: **0%**

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

Attendance at, and reasonable engagement in, Small Group Teaching Activities (SGTA) in all first year mathematics units is compulsory.

Participation will be assessed by instructors via rosters and observation of students' work during classes.

Attendance and reasonable engagement in the class activities in, at least, 10 out of 12 of the classes are requirements to pass the unit. This is a hurdle requirement.

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.
- 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.
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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.

Delivery and Resources

Classes

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

SGTA: you should attend one SGTA each week (starting in Week 1).

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 aspects of 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.

- *Calculus - single & multivariable*, Hughes-Hallett, Gleason & McCallum (7th edition), John Wiley.

See <http://www.wileydirect.com.au/buy/calculus-single-multivariable-7th-edition/>

The textbook is available online for free from the [library](#). On the "advanced search" link for multisearch, put in the title "calculus" and the author "hughes-hallett", and it is the first result. Next, ask to see all editions. Choosing the seventh edition takes you to where you can obtain online access, and download or view pdfs.

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

Additional Notes

- [Numeracy Centre notes \(MUMS Modules\)](#) 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. There are computers for student use in the Library, including laptops for loan.

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

25/2/2019	Introduction. Numbers	Graphs	
4/3/2019	Fractions. Factoring. Laws of exponents	The XY plane	
11/3/2019	Linear equations, ...	The derivative: introduction, definition and meaning	
18/3/2019	... word problems, percentages	The derivative: rules	
25/3/2019	Linear systems. Quadratics	The derivative: uses in economics	
1/4/2019	Exponentials and logarithms	Optimisation	
8/4/2019	Exponentials and logarithms, continued	Functions of several variables	A1 Vodcast group
	Mid Semester Break		
29/4/2019	Inequalities. Absolute value	Lagrange Multipliers	
6/5/2019	Arithmetic and geometric progressions	Derivatives of Exponentials and logarithms; Newton's Method	
13/5/2019	Applications of GPs to finance	Integration: introduction, meaning, definition, computation, FTC	Vodcast
20/5/2019	Matrices	Integration: numerical, rules, substitution	
27/5/2019	Matrices, continued	Integration: uses in Economics	A2
3/6/2019	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.

SGTA

There will be one compulsory one-hour SGTA class per week, starting in Week 1. The SGTA questions will be available on iLearn by the end of the previous week. Each set of SGTA questions will contain:

- A preparatory set of questions to be completed before the SGTA to reinforce the basic concepts in the previous weeks lectures. You will be given short answers to these questions at the beginning of the SGTA to allow you to check your own work.
- A set of questions that will be discussed in the SGTA. Mathematics is best learnt by active participation in solving problems, and you will gain the most benefit from these classes by actively participating in the discussion of these problems and asking for clarification of things you do not understand. Your instructor 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 SGTA. If time permits, some of these questions may be considered in the SGTA. A set of model answers for the SGTA questions will be posted on iLearn at the end of each week.

Assignments

There will be two 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. ALL SUBMITTED WORK MUST HAVE A FULLY COMPLETED COVER SHEET - NO COVER SHEET NO MARKS!

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) (<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](http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<http://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 published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) 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 or if you are a Global MBA student contact globalmba.support@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

If you are a Global MBA student contact globalmba.support@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.
- 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.
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- 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

- 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 SGTA class per week, starting in Week 1. The SGTA questions will be available on iLearn by the end of the previous week. Each set of SGTA questions will contain:
 - A preparatory set of questions to be completed before the SGTA to reinforce the basic concepts in the previous weeks lectures. You will be given short answers to these questions at the beginning of the SGTA to allow you to check your own work.
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- There will be two 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. ALL SUBMITTED WORK MUST HAVE A FULLY COMPLETED COVER SHEET - NO COVER SHEET NO MARKS!

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

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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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Assessment tasks

- Group work video
- Assignments
- SGTA Participation

Learning and teaching activities

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study session without running the risk of breaching the rules relating to academic misconduct. ALL SUBMITTED WORK MUST HAVE A FULLY COMPLETED COVER SHEET - NO COVER SHEET NO MARKS!

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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- 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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- Assignments
- Final examination

- SGTA Participation

Learning and teaching activities

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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

- 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.

Assessment tasks

- Group work video
- Assignments
- Final examination
- SGTA Participation

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.
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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.

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.
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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.

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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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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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Assessment task

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Changes since First Published

Date	Description
15/02/2019	The Assessment Tasks section stated 3 Assignment due dates, when there are now only 2 assignments, as listed in the timetable. The inconsistency has been fixed.
2019	Instructions for the Vodcast task have been clarified, with due dates given. In the Unit Timetable, the columns for Algebra and Calculus are swapped. This now corresponds to the lecture days: Tuesday (Algebra) & Friday (Calculus).