MATH6904

Mathematical Modelling

Session 1, Special circumstances 2021

Archive (Pre-2022) - Department of Mathematics and Statistics

Contents

Disclaimer

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Notice

As part of Phase 3 of our return to campus plan, most units will now run tutorials, seminars and other small group activities on campus, and most will keep an online version available to those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face activities for your unit, please go to timetable viewer. To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

General Information

Unit convenor and teaching staff
Convenor/Lecturer
Paul Bryan
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Contact via Email
Please refer to iLearn

Lecturer
Christian Thomas
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Credit points
10

Prerequisites

Corequisites

Co-badged status
MATH1010

Unit description

*This unit has an online offering for S2 which is **synchronous**, meaning there will be set times to attend online lectures and tutorials.*

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. A key focus of the unit is the development of a sound grasp of how mathematics is used to provide sophisticated modelling of complex real problems. The algebra content of the unit includes topics such as linear systems, matrices, determinants, vector spaces, eigenvalues and eigenvectors. The study of these topics is applied to model various economic problems such as Leontief input-output models and dynamical systems used to predict long-term behaviours. The calculus content includes 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. The techniques studied in the calculus are used to study and solve a wide variety of economic and financial problems.

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:

ULO1: Develop of a range of algebraic skills and proficiency in algebraic techniques applicable to economics, finance and statistics.

ULO2: Demonstrate knowledge of linear equations and linear models to solve problems in economics, finance and statistics.

ULO3: Apply a wide range of techniques and ideas from differential and integral calculus to the analyse business, economic and financial data.

ULO4: Investigate a range of optimisation problems using the techniques of calculus.

ULO5: Formulate models of a variety of real world situations using techniques from differential equations.

General Assessment Information

HURDLES: Attendance at, and reasonable engagement in, Small Group Teaching Activities (SGTA) classes in all first year mathematics and statistics units is **compulsory**. 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. This is a hurdle requirement.

The Major Test 1 is also a hurdle. See the unit iLearn page for more detail.

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 will miss a class, you can apply for Special Consideration via ask.mq.edu.au.

ASSIGNMENT SUBMISSION: Assignment submission will be online through the iLearn page.

Submit assignments online via the appropriate assignment link on the iLearn page. A personalised cover sheet is not required with online submissions. Read the submission statement carefully before accepting it as there are substantial penalties for making a false declaration.

- Assignment submission is via iLearn. You should upload this as a single scanned PDF file.
- Please note the quick guide on how to upload your assignments provided on the iLearn page.
- Please make sure that each page in your uploaded assignment corresponds to only one A4 page (do not upload an A3 page worth of content as an A4 page in landscape). If you are using an app like Clear Scanner, please make sure that the photos you are using are clear and shadow-free.
- It is your responsibility to make sure your assignment submission is legible.
- If there are technical obstructions to your submitting online, please email us to let us know.

You may submit as often as required prior to the due date/time. Please note that each submission will completely replace any previous submissions. It is in your interests to make frequent submissions of your partially completed work as insurance against technical or other problems near the submission deadline.

LATE SUBMISSION OF WORK: All assessment tasks must be submitted by the official due date and time. In the case of a late submission for a non-timed assessment (e.g. an assignment), if special consideration has NOT been granted, 20% of the earned mark will be deducted for each 24-hour period (or part thereof) that the submission is late for the first 2 days (including weekends and/or public holidays). For example, if an assignment is submitted 25 hours late, its mark will attract a penalty equal to 40% of the earned mark. After 2 days (including weekends and public holidays) a mark of 0% will be awarded. Timed assessment tasks (e.g. tests, examinations) do not fall under these rules.

FINAL EXAM POLICY: 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 this 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/FSESupp) 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
Major Test 1 (online)	20%	Yes	Week 5
Major Test 2 (online)	20%	No	Week 11
Matlab Assignment	10%	No	Week 12
Final Examination	50%	No	Exam Period

Major Test 1 (online)

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 7 hours
Due: **Week 5**
Weighting: **20%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

This will be an online test held during the semester. It will test the ability of students to analyse and solve mathematical problems using concepts and techniques in linear algebra and calculus.

On successful completion you will be able to:

• Develop of a range of algebraic skills and proficiency in algebraic techniques applicable to economics, finance and statistics.

• Demonstrate knowledge of linear equations and linear models to solve problems in economics, finance and statistics.

- Apply a wide range of techniques and ideas from differential and integral calculus to the analyse business, economic and financial data.
- Investigate a range of optimisation problems using the techniques of calculus.
- Formulate models of a variety of real world situations using techniques from differential equations.

Major Test 2 (online)

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 7 hours
Due: **Week 11**
Weighting: **20%**

This will be an online test held during the semester. It will test the ability of students to analyse and solve mathematical problems using concepts and techniques in linear algebra and calculus.

On successful completion you will be able to:
- Develop of a range of algebraic skills and proficiency in algebraic techniques applicable to economics, finance and statistics.
- Demonstrate knowledge of linear equations and linear models to solve problems in economics, finance and statistics.
- Apply a wide range of techniques and ideas from differential and integral calculus to the analyse business, economic and financial data.
- Investigate a range of optimisation problems using the techniques of calculus.
- Formulate models of a variety of real world situations using techniques from differential equations.

Matlab Assignment

Assessment Type [1]: Problem set
Indicative Time on Task [2]: 7 hours
Due: **Week 12**
Weighting: **10%**

The problem set will be aimed at introducing Matlab as a mathematical tool. It will ask students to perform various tasks using Matlab, such as plotting functions, computing derivatives and integrals, performing Gaussian elimination, and solving linear optimisation problems.

On successful completion you will be able to:
- Develop of a range of algebraic skills and proficiency in algebraic techniques applicable to economics, finance and statistics.
- Demonstrate knowledge of linear equations and linear models to solve problems in economics, finance and statistics.
- Apply a wide range of techniques and ideas from differential and integral calculus to the analyse business, economic and financial data.
- Investigate a range of optimisation problems using the techniques of calculus.
- Formulate models of a variety of real world situations using techniques from differential equations.

Final Examination

Assessment Type [1]: Examination
Indicative Time on Task [2]: 15 hours
Due: **Exam Period**
Weighting: **50%**

This will be an invigilated exam, held during the final exam period. It will test the ability of students to synthesise the concepts taught in the course in order to analyse and solve mathematical problems with various applications.

On successful completion you will be able to:
- Develop of a range of algebraic skills and proficiency in algebraic techniques applicable to economics, finance and statistics.
- Demonstrate knowledge of linear equations and linear models to solve problems in economics, finance and statistics.
- Apply a wide range of techniques and ideas from differential and integral calculus to the analyse business, economic and financial data.
- Investigate a range of optimisation problems using the techniques of calculus.
- Formulate models of a variety of real world situations using techniques from differential equations.

[1] If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this

type of assessment

- the Writing Centre for academic skills support.

[2] Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

Classes:

- Lectures: There are two hours of online lectures each week.
- SGTA classes: There is one one-hour SGTA class per week.

Course Notes: Student notes will be posted on iLearn.

Suggested textbooks:

- Algebra - *Lay*, Linear Algebra and its Applications, 5th edition.
- Calculus - *Stewart*, Calculus (Metric Version), 8th edition.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://policies.mq.edu.au). 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

Students seeking more policy resources can visit Student Policies (https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit Policy Central (https://policies.mq.edu.au) and use the search tool.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/admin/other-resources/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 help you improve your marks and take control of your study.

- Getting help with your assignment
- Workshops
- StudyWise
- Academic Integrity Module

The Library provides online and face to face support to help you find and use relevant information resources.

- Subject and Research Guides
- Ask a Librarian

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.

Changes since First Published

Date	Description
11/02/2021	General Information section was updated along with co-badged status