MACQUARIE University
SYDNEY · AUSTRALIA

MATH1015
Calculus and Linear Algebra I (Advanced)
Session 1, Special circumstances 2021
Department of Mathematics and Statistics

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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**  
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Please refer to iLearn

**Lecturer**  
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Frank Schoenig  
[frank.schoenig@mq.edu.au](mailto:frank.schoenig@mq.edu.au)

**Credit points**  
10

**Prerequisites**  
(HSC Mathematics Extension 1 Band E3 and above or HSC Mathematics Extension 2) or admission to BMathSci or BAdvSc in Advanced Mathematics or BActStud or BActStudBSc or BAppFinBActStud or BActStudBProfPrac or BActStudProfPrac(Hons)

**Corequisites**

**Co-badged status**
Unit description
This is the first mainstream university mathematics unit and is presented at a more advanced level than MATH1010. The material covered is essential for students studying mathematical or actuarial sciences. This subject provides an introduction to basic concepts and techniques in linear algebra and calculus. In algebra, topics covered include matrices, systems of linear equations and their applications, including the use of vectors in two and three-dimensional Euclidean geometry and linear optimisation. In calculus, the concept of a function of one variable is explored, and the notions of limit and continuity are developed. The concept of the derivative as a suitable construct to describe rates of change is defined and techniques of differential and integral calculus of functions of a real variable are developed. Some simple differential equations and their role as quantitative models for dynamic processes, are discussed. Students are also introduced to the use of computers in mathematics, and develop modelling and problem solving skills through theoretical and practical problems.

Important Academic Dates
Information about important academic dates including deadlines for withdrawing from units are available at https://students.mq.edu.au/important-dates

Learning Outcomes
On successful completion of this unit, you will be able to:

UL01: Determine solutions to linear systems of equations using matrix tools and techniques.
UL02: Employ techniques from linear algebra to analyse structures in 2- and 3-D Euclidean space, including vectors, lines and planes.
UL03: Analyze a mathematical problem using concepts of limits, continuity and differentiability.
UL04: Utilise the techniques of differentiation and integration with proficiency to a wide range of functions.
UL05: Evaluate the context of a mathematical statement in order to determine the validity of a given argument, and to construct mathematical proofs.

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**

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Hurdle</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation in SGTA classes</td>
<td>0%</td>
<td>Yes</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Major Test 1 (online)</td>
<td>20%</td>
<td>Yes</td>
<td>Week 5</td>
</tr>
<tr>
<td>Major Test 2 (online)</td>
<td>20%</td>
<td>No</td>
<td>Week 11</td>
</tr>
<tr>
<td>Assignment</td>
<td>10%</td>
<td>No</td>
<td>Week 12</td>
</tr>
<tr>
<td>Examination</td>
<td>50%</td>
<td>No</td>
<td>Examination Period</td>
</tr>
</tbody>
</table>

**Participation in SGTA classes**

Assessment Type 1: Participatory task  
Indicative Time on Task 2: 0 hours  
Due: Ongoing  
Weighting: 0%  
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Students are expected to demonstrate their ability to engage with the unit by participating in SGTA classes.

On successful completion you will be able to:

- Determine solutions to linear systems of equations using matrix tools and techniques.
- Employ techniques from linear algebra to analyse structures in 2- and 3-D Euclidean space, including vectors, lines and planes.
- Analyze a mathematical problem using concepts of limits, continuity and differentiability.
- Utilise the techniques of differentiation and integration with proficiency to a wide range of functions.
• Evaluate the context of a mathematical statement in order to determine the validity of a
given argument, and to construct mathematical proofs.

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:
• Determine solutions to linear systems of equations using matrix tools and techniques.
• Employ techniques from linear algebra to analyse structures in 2- and 3-D Euclidean
  space, including vectors, lines and planes.
• Analyze a mathematical problem using concepts of limits, continuity and differentiability.
• Utilise the techniques of differentiation and integration with proficiency to a wide range of
  functions.
• Evaluate the context of a mathematical statement in order to determine the validity of a
given argument, and to construct mathematical proofs.

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:
• Determine solutions to linear systems of equations using matrix tools and techniques.
Employ techniques from linear algebra to analyse structures in 2- and 3-D Euclidean space, including vectors, lines and planes.

Analyze a mathematical problem using concepts of limits, continuity and differentiability.

Utilise the techniques of differentiation and integration with proficiency to a wide range of functions.

Evaluate the context of a mathematical statement in order to determine the validity of a given argument, and to construct mathematical proofs.

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

This assignment will test the ability of students to solve theoretical mathematical problems using concepts and techniques from linear algebra and calculus, and prove mathematical statements.

On successful completion you will be able to:

Determine solutions to linear systems of equations using matrix tools and techniques.

Employ techniques from linear algebra to analyse structures in 2- and 3-D Euclidean space, including vectors, lines and planes.

Analyze a mathematical problem using concepts of limits, continuity and differentiability.

Utilise the techniques of differentiation and integration with proficiency to a wide range of functions.

Evaluate the context of a mathematical statement in order to determine the validity of a given argument, and to construct mathematical proofs.

Examination
Assessment Type 1: Examination
Indicative Time on Task 2: 15 hours
Due: Examination 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:

• Determine solutions to linear systems of equations using matrix tools and techniques.
• Employ techniques from linear algebra to analyse structures in 2- and 3-D Euclidean space, including vectors, lines and planes.
• Analyze a mathematical problem using concepts of limits, continuity and differentiability.
• Utilise the techniques of differentiation and integration with proficiency to a wide range of functions.
• Evaluate the context of a mathematical statement in order to determine the validity of a given argument, and to construct mathematical proofs.

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 Learning Skills Unit 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 one-hour online lectures each week.
• SGTA classes: Students must register in and attend one one-hour class per week. This is a hurdle requirement.

**Course Notes:** Student notes will be posted on iLearn.

**Suggested textbooks:**

The following textbooks are useful as supplementary resources:

• Calculus - Stewart, Calculus (Metric Version), 8th edition.

**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). Students should be aware of the following policies in particular with regard to Learning and Teaching:
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/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.
Student Enquiry Service
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

Equity 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.

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

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>11/02/2021</td>
<td>Update to Delivery and Resources section</td>
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