MATH2210

Pure Mathematics II

Session 2, Special circumstances 2021

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

Contents

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Session 2 Learning and Teaching Update

The decision has been made to conduct study online for the remainder of Session 2 for all units WITHOUT mandatory on-campus learning activities. Exams for Session 2 will also be online where possible to do so.

This is due to the extension of the lockdown orders and to provide certainty around arrangements for the remainder of Session 2. We hope to return to campus beyond Session 2 as soon as it is safe and appropriate to do so.

Some classes/teaching activities cannot be moved online and must be taught on campus. You should already know if you are in one of these classes/teaching activities and your unit convenor will provide you with more information via iLearn. If you want to confirm, see the list of units with mandatory on-campus classes/teaching activities.

Visit the MQ COVID-19 information page for more detail.

General Information

Unit convenor and teaching staff
Steve Lack
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Credit points
10

Prerequisites
MATH2010 or MATH235

Corequisites

Co-badged status

Unit description
This unit will introduce students to the abstract approach to mathematics, which offers great benefits in terms of simplicity, rigour, and generality. The key components of this are the careful definition of the objects of interest, the development of intuition allowing consequences of these definitions to be found, and the rigorous proof of these consequences. As such, it represents an important stepping stone towards many later mathematics units, as well as being valuable in its own right. This introduction will be taught in the context of different areas of mathematics, including: analysis, which concerns limits and convergence in many contexts; algebra, which concerns the nature and properties of mathematical operations; and discrete mathematics, which involves topics such as logic and counting.

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: Demonstrate an understanding of the abstract approach to mathematics, including its benefits with regards to simplicity, rigour, and generality.

ULO2: Construct formal proofs of simple statements in the subject areas of the unit.

ULO3: Formulate problems in mathematical terms using a variety of methods from

analysis, algebra, and discrete mathematics.

ULO4: Demonstrate an understanding of the breadth of the discipline, its role in other fields, and the way other fields contribute to the development of the mathematical sciences.

ULO5: Appropriately interpret information communicated in mathematical form.

ULO6: Appropriately present information, reasoning and conclusions in a variety of modes to diverse audiences (expert and non-expert).

ULO7: Demonstrate an understanding of ethical issues relating to professional mathematical work, identify and address ethical issues arising in such professional work and make ethical decisions while collecting and analysing data and reporting findings.

ULO8: Work effectively, responsibly and safely in an individual or team context.

General Assessment Information

General Assessment Information

HURDLES: Collaboration in the SGTAs is a hurdle requirement. You must attend and participate in at least 10 of the 12 SGTAs. (Of course you should actually do so for all of them.)

ONLINE SUBMISSION: Submission of assignments and the report will be online through the appropriate link on the MATH2210 iLearn page.

A personalized 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.

You should upload your work as a single scanned PDF file.

Please make sure that each page in your uploaded assignment or report 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.

It is recommended that students use the following computer software to prepare the report:

- **LaTeX**: LaTeX is a free mathematical typesetting program. Access and installation instructions may be found at: https://www.latex-project.org/get/
    - Students may also use the free online LaTeX compiler, Overleaf, which is found

at: https://www.overleaf.com

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 (for example, 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 (for example, tests and examinations) do not fall under these rules.

FINAL EXAM POLICY: 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.

SUPPLEMENTARY EXAMINATIONS:

IMPORTANT: 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. If you apply for special consideration, you must give the supplementary examination priority over any other pre-existing commitments, as such commitments will not usually be considered an acceptable basis for a second application for special consideration. 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 (https://bit.ly/FSESupp) for dates, and approved applicants will receive an individual notification sometime in the week prior to the exam with the exact date and time of their supplementary examination.

Assessment Tasks

Name	Weighting	Hurdle	Due
Collaboration in SGTAs	0%	Yes	Weeks 2-13
Assignment 1	20%	No	Week 6
Assignment 2	20%	No	Week 12
Report	20%	No	Week 13
Final Exam	40%	No	Final Exam period

Collaboration in SGTAs

Assessment Type [1]: Participatory task
Indicative Time on Task [2]: 0 hours
Due: **Weeks 2-13**

Weighting: **0%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Students will be required to work in the SGTAs in a collaborative, professional, and ethical manner.

On successful completion you will be able to:
- Appropriately present information, reasoning and conclusions in a variety of modes to diverse audiences (expert and non-expert).
- Demonstrate an understanding of ethical issues relating to professional mathematical work, identify and address ethical issues arising in such professional work and make ethical decisions while collecting and analysing data and reporting findings.
- Work effectively, responsibly and safely in an individual or team context.

Assignment 1

Assessment Type [1]: Problem set
Indicative Time on Task [2]: 5 hours
Due: **Week 6**
Weighting: **20%**

Set of questions with short answers involving proofs, calculations, and written responses.

On successful completion you will be able to:
- Demonstrate an understanding of the abstract approach to mathematics, including its benefits with regards to simplicity, rigour, and generality.
- Construct formal proofs of simple statements in the subject areas of the unit.
- Formulate problems in mathematical terms using a variety of methods from analysis, algebra, and discrete mathematics.
- Demonstrate an understanding of the breadth of the discipline, its role in other fields, and the way other fields contribute to the development of the mathematical sciences.
- Appropriately interpret information communicated in mathematical form.
- Appropriately present information, reasoning and conclusions in a variety of modes to diverse audiences (expert and non-expert).

Assignment 2

Assessment Type [1]: Problem set
Indicative Time on Task [2]: 5 hours
Due: **Week 12**
Weighting: **20%**

Set of questions with short answers involving proofs, calculations, and written responses.

On successful completion you will be able to:

- Demonstrate an understanding of the abstract approach to mathematics, including its benefits with regards to simplicity, rigour, and generality.
- Construct formal proofs of simple statements in the subject areas of the unit.
- Formulate problems in mathematical terms using a variety of methods from analysis, algebra, and discrete mathematics.
- Demonstrate an understanding of the breadth of the discipline, its role in other fields, and the way other fields contribute to the development of the mathematical sciences.
- Appropriately interpret information communicated in mathematical form.
- Appropriately present information, reasoning and conclusions in a variety of modes to diverse audiences (expert and non-expert).

Report

Assessment Type [1]: Report
Indicative Time on Task [2]: 10 hours
Due: **Week 13**
Weighting: **20%**

Report building on one of the topics covered in lectures.

On successful completion you will be able to:

- Demonstrate an understanding of the abstract approach to mathematics, including its benefits with regards to simplicity, rigour, and generality.
- Construct formal proofs of simple statements in the subject areas of the unit.
- Formulate problems in mathematical terms using a variety of methods from analysis, algebra, and discrete mathematics.

- Demonstrate an understanding of the breadth of the discipline, its role in other fields, and the way other fields contribute to the development of the mathematical sciences.
- Appropriately interpret information communicated in mathematical form.
- Appropriately present information, reasoning and conclusions in a variety of modes to diverse audiences (expert and non-expert).

Final Exam

Assessment Type [1]: Examination
Indicative Time on Task [2]: 13 hours
Due: **Final Exam period**
Weighting: **40%**

This will be a summative examination conducted during the final examination period.

On successful completion you will be able to:
- Demonstrate an understanding of the abstract approach to mathematics, including its benefits with regards to simplicity, rigour, and generality.
- Construct formal proofs of simple statements in the subject areas of the unit.
- Formulate problems in mathematical terms using a variety of methods from analysis, algebra, and discrete mathematics.
- Demonstrate an understanding of the breadth of the discipline, its role in other fields, and the way other fields contribute to the development of the mathematical sciences.
- Appropriately interpret information communicated in mathematical form.

[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

There will be 2 hours of lectures each week, and 1 hour SGTA, starting from week 2.

There is no official textbook for this unit. Detailed notes will be provided, supplemented by links to online material where appropriate.

Unit Schedule

Week	Topic
1	Sets and counting
2	Relations
3	Natural numbers
4	Integers and rational numbers
5	Real numbers
6	Complex numbers
7	Continuity
8	Compactness
9	Banach spaces
10	Differentiability
11	Fixed point theorems
12	Inverse and implicit function theorems
13	Revision

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.