



# MATH7907

## Advanced Methods in Mathematics 1

Session 1, In person-scheduled-weekday, North Ryde 2022

*School of Mathematical and Physical Sciences*

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## General Information

Unit convenor and teaching staff Frank Valckenborgh <a href="mailto:frank.valckenborgh@mq.edu.au">frank.valckenborgh@mq.edu.au</a>
Credit points 10
Prerequisites Admission to MRes
Corequisites
Co-badged status
Unit description This unit is based on an area of current mathematical research. The specific area may vary from year to year depending on the interests of the students and lecturer.

## 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 advanced disciplinary knowledge and skills in a particular area of mathematics.

**ULO2:** Apply advanced mathematical skills to related areas of mathematics or other disciplines.

**ULO3:** Use abstract mathematical frameworks to synthesize diverse examples or phenomena from within a particular area of mathematics.

**ULO4:** Communicate effectively the results of advanced mathematical reasoning.

## General Assessment Information

### General Faculty Policy on assessment submission deadlines and late submissions:

Online quizzes, in-class activities, or scheduled tests and exam must be undertaken at the time indicated in the unit guide. Should these activities be missed due to illness or misadventure, students may apply for Special Consideration.

All other assessments must be submitted by 5:00 pm on their due date.

Should these assessments be missed due to illness or misadventure, students should apply for Special Consideration.

Assessments not submitted by the due date will receive a mark of zero **unless** late submissions are specifically allowed as indicated in the unit guide or on iLearn.

If late submissions are permitted as indicated in the unit guide or on iLearn a consistent penalty will be applied for late submissions as follows:

A 12-hour grace period will be given after which the following deductions will be applied to the awarded assessment mark: 12 to 24 hours late = 10% deduction; for each day thereafter, an additional 10% per day or part thereof will be applied until five days beyond the due date. After this time, a mark of zero (0) will be given. For example, an assessment worth 20% is due 5 pm on 1 January. Student A submits the assessment at 1 pm, 3 January. The assessment received a mark of 15/20. A 20% deduction is then applied to the mark of 15, resulting in the loss of three (3) marks. Student A is then awarded a final mark of 12/20.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Assignment 1</a>	25%	No	Week 4
<a href="#">Assignment 2</a>	25%	No	Week 7
<a href="#">Assignment 3</a>	25%	No	Week 10
<a href="#">Assignment 4</a>	25%	No	Week 13

### Assignment 1

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 10 hours

Due: **Week 4**

Weighting: **25%**

The assignments reinforce and build on material from lectures, as well as leading students towards more advanced topics. They are designed to promote a more independent style of learning than in standard undergraduate units.

On successful completion you will be able to:

- Demonstrate advanced disciplinary knowledge and skills in a particular area of mathematics.

- Apply advanced mathematical skills to related areas of mathematics or other disciplines.
- Use abstract mathematical frameworks to synthesize diverse examples or phenomena from within a particular area of mathematics.
- Communicate effectively the results of advanced mathematical reasoning.

## Assignment 2

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 10 hours

Due: **Week 7**

Weighting: **25%**

The assignments reinforce and build on material from lectures, as well as leading students towards more advanced topics. They are designed to promote a more independent style of learning than in standard undergraduate units.

On successful completion you will be able to:

- Demonstrate advanced disciplinary knowledge and skills in a particular area of mathematics.
- Apply advanced mathematical skills to related areas of mathematics or other disciplines.
- Use abstract mathematical frameworks to synthesize diverse examples or phenomena from within a particular area of mathematics.
- Communicate effectively the results of advanced mathematical reasoning.

## Assignment 3

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 10 hours

Due: **Week 10**

Weighting: **25%**

The assignments reinforce and build on material from lectures, as well as leading students towards more advanced topics. They are designed to promote a more independent style of learning than in standard undergraduate units.

On successful completion you will be able to:

- Demonstrate advanced disciplinary knowledge and skills in a particular area of

mathematics.

- Apply advanced mathematical skills to related areas of mathematics or other disciplines.
- Use abstract mathematical frameworks to synthesize diverse examples or phenomena from within a particular area of mathematics.
- Communicate effectively the results of advanced mathematical reasoning.

## Assignment 4

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 10 hours

Due: **Week 13**

Weighting: **25%**

The assignments reinforce and build on material from lectures, as well as leading students towards more advanced topics. They are designed to promote a more independent style of learning than in standard undergraduate units.

On successful completion you will be able to:

- Demonstrate advanced disciplinary knowledge and skills in a particular area of mathematics.
- Apply advanced mathematical skills to related areas of mathematics or other disciplines.
- Use abstract mathematical frameworks to synthesize diverse examples or phenomena from within a particular area of mathematics.
- Communicate effectively the results of advanced mathematical reasoning.

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<sup>1</sup> 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.

<sup>2</sup> 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 one 2 hour live interactive learning activity each week.

# Unit Schedule

## Planned Unit Schedule

Week	Topics
1	Topological Spaces.
2	New Spaces from Old (Part 1).
3	New Spaces from Old (Part 2).
4	Connectedness.
5	Compactness.
6	Paracompactness and Partitions of Unity.
7	Topological Groups and Group Actions.
8	Topological Manifolds.
9	Homotopy.
10	The Fundamental Group.
11	Covering Maps (Part 1).
12	Covering Maps (Part 2).
13	Principal Bundles.

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](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](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/support/study/policies\)](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 \(https://policies.mq.edu.au\)](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](https://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

## The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the 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

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)

## Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](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.