



# MATH704

## Research Topics in Mathematics 1

S2 Day 2018

*Dept of Mathematics*

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#### **Disclaimer**

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## General Information

Unit convenor and teaching staff Paul Bryan <a href="mailto:paul.bryan@mq.edu.au">paul.bryan@mq.edu.au</a> Contact via email 12 WW 617 By appointment
Credit points 4
Prerequisites Admission to MRes
Corequisites
Co-badged status
Unit description This unit is study of a current topic of Mathematical research. In addition to mastering the material delivered in lectures, the student will be required to undertake independent reading and write a short report on what they have learned. This will be written using LaTeX, with instruction in this typesetting language and BibTeX as part of the unit's curriculum.

## 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:

By the end of the course, students will understand the basic objects of study in differential geometry such as curves, surfaces and manifolds and in particular their curvature. Students will also have developed the techniques to do calculus and geometry on such objects.

Students will gain research skills such as the ability to learn from resources beyond the classroom and provided lecture notes by reading and analysing sources such as text books and research papers.

Students will develop the ability to construct logical arguments and to write clearly on the

course matter.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Assignments 1</u>	15%	No	Week 4
<u>Assignment 2</u>	15%	No	Week 8
<u>Assignment 3</u>	15%	No	Week 12
<u>Exam</u>	55%	No	Exam period

### Assignments 1

Due: **Week 4**

Weighting: **15%**

Assignment 1

On successful completion you will be able to:

- By the end of the course, students will understand the basic objects of study in differential geometry such as curves, surfaces and manifolds and in particular their curvature. Students will also have developed the techniques to do calculus and geometry on such objects.
- Students will gain research skills such as the ability to learn from resources beyond the classroom and provided lecture notes by reading and analysing sources such as text books and research papers.
- Students will develop the ability to construct logical arguments and to write clearly on the course matter.

### Assignment 2

Due: **Week 8**

Weighting: **15%**

Assignment 2

On successful completion you will be able to:

- By the end of the course, students will understand the basic objects of study in differential geometry such as curves, surfaces and manifolds and in particular their curvature. Students will also have developed the techniques to do calculus and geometry

on such objects.

- Students will gain research skills such as the ability to learn from resources beyond the classroom and provided lecture notes by reading and analysing sources such as text books and research papers.
- Students will develop the ability to construct logical arguments and to write clearly on the course matter.

## Assignment 3

Due: **Week 12**

Weighting: **15%**

Assignment 3

On successful completion you will be able to:

- By the end of the course, students will understand the basic objects of study in differential geometry such as curves, surfaces and manifolds and in particular their curvature. Students will also have developed the techniques to do calculus and geometry on such objects.
- Students will gain research skills such as the ability to learn from resources beyond the classroom and provided lecture notes by reading and analysing sources such as text books and research papers.
- Students will develop the ability to construct logical arguments and to write clearly on the course matter.

## Exam

Due: **Exam period**

Weighting: **55%**

Final exam.

On successful completion you will be able to:

- By the end of the course, students will understand the basic objects of study in differential geometry such as curves, surfaces and manifolds and in particular their curvature. Students will also have developed the techniques to do calculus and geometry on such objects.
- Students will develop the ability to construct logical arguments and to write clearly on the course matter.

## Delivery and Resources

The following references may prove useful.

### References:

1. *Differential geometry of curves and surfaces*, Manfredo do Carmo, Prentice-Hall (1976).
2. *Curves and Surfaces*, [Sebastián Montiel](#) and Antonio Ros, AMS (2009).
3. *Elementary Differential Geometry*, Christian Bär, Cambridge University Press (2010).
4. *Differential Topology*, Victor Guillemin and Alan Pollack, AMS (1974).
5. *Riemannian Geometry*, Manfredo do Carmo, Prentice-Hall (1976).
6. *Introduction to smooth manifolds*, John Lee, Springer Verlag (2003).
7. *Riemannian Manifolds – An Introduction To Curvature*, John Lee, Springer Verlag (1997)

## 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](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central)

[s://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)).

## 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 shown in *iLearn*, 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](http://ask.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](http://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](http://ask.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/](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

### PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of

knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

## **Learning outcomes**

- By the end of the course, students will understand the basic objects of study in differential geometry such as curves, surfaces and manifolds and in particular their curvature. Students will also have developed the techniques to do calculus and geometry on such objects.
- Students will develop the ability to construct logical arguments and to write clearly on the course matter.

## **Assessment tasks**

- Assignments 1
- Assignment 2
- Assignment 3
- Exam

## **PG - Critical, Analytical and Integrative Thinking**

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

## **Learning outcomes**

- By the end of the course, students will understand the basic objects of study in differential geometry such as curves, surfaces and manifolds and in particular their curvature. Students will also have developed the techniques to do calculus and geometry on such objects.
- Students will gain research skills such as the ability to learn from resources beyond the classroom and provided lecture notes by reading and analysing sources such as text books and research papers.
- Students will develop the ability to construct logical arguments and to write clearly on the course matter.

## **Assessment tasks**

- Assignments 1

- Assignment 2
- Assignment 3
- Exam

## PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

### Learning outcomes

- By the end of the course, students will understand the basic objects of study in differential geometry such as curves, surfaces and manifolds and in particular their curvature. Students will also have developed the techniques to do calculus and geometry on such objects.
- Students will gain research skills such as the ability to learn from resources beyond the classroom and provided lecture notes by reading and analysing sources such as text books and research papers.

### Assessment tasks

- Assignments 1
- Assignment 2
- Assignment 3
- Exam

## PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

### Learning outcome

- Students will develop the ability to construct logical arguments and to write clearly on the course matter.

### Assessment tasks

- Assignments 1



- Assignment 2
- Assignment 3
- Exam