MATH3900
Geometry and Topology
Session 1, In person-scheduled-weekday, North Ryde 2024

School of Mathematical and Physical Sciences

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## General Information

Unit convenor and teaching staff
Lecturer
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Ji Li
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Credit points
10

Prerequisites
130cp including MATH2010 or MATH235

Corequisites

Co-badge status

Unit description
This unit is designed to widen geometric intuition and horizons by studying topics such as projective geometry, topology of surfaces, graph theory, map colouring, ruler-and-compass constructions, knot theory and isoperimetric 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](https://www.mq.edu.au/study/calendar-of-dates)

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

**ULO1:** Formulate and model practical and abstract problems in mathematical terms using methods from geometry and topology

**ULO2:** Apply concepts and techniques of geometry and topology to practical and abstract problems

**ULO3:** Use axioms and definitions correctly within a mathematical argument

**ULO4:** Apply the mathematical notions of invariant and isomorphism in order to discriminate and classify geometric objects
General Assessment Information

1. Requirements to Pass this Unit
To pass this unit you must achieve a total mark equal to or greater than 50%

2. Hurdle Assessments
There are no hurdle assessments for this unit.

3. Late Assessment Submission Penalty
Late assessments are not accepted in this unit unless a Special Consideration has been submitted and approved.

4. Special Consideration
The Special Consideration Policy aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment. If you experience circumstances or events that affect your ability to complete the written assessments in this unit on time, please inform the convenor and submit a Special Consideration request through ask.mq.edu.au.

Assessment Tasks

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Hurdle</th>
<th>Due</th>
</tr>
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<tbody>
<tr>
<td>Final Exam</td>
<td>55%</td>
<td>No</td>
<td>Examination period</td>
</tr>
<tr>
<td>Assignment 1</td>
<td>15%</td>
<td>No</td>
<td>Week 6</td>
</tr>
<tr>
<td>Class Test</td>
<td>15%</td>
<td>No</td>
<td>Week 9</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>15%</td>
<td>No</td>
<td>Week 11</td>
</tr>
</tbody>
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Final Exam
Assessment Type 1: Examination
Indicative Time on Task 2: 12 hours
Due: Examination period
Weighting: 55%

This will be an invigilated exam that covers all aspects of the unit

On successful completion you will be able to:
• Formulate and model practical and abstract problems in mathematical terms using methods from geometry and topology
• Apply concepts and techniques of geometry and topology to practical and abstract problems
• Use axioms and definitions correctly within a mathematical argument
• Apply the mathematical notions of invariant and isomorphism in order to discriminate and classify geometric objects

Assignment 1
Assessment Type 1: Problem set
Indicative Time on Task 2: 5 hours
Due: Week 6
Weighting: 15%

The assignments will include questions from both the topology and the geometry component of the unit.

On successful completion you will be able to:
• Formulate and model practical and abstract problems in mathematical terms using methods from geometry and topology
• Apply concepts and techniques of geometry and topology to practical and abstract problems
• Use axioms and definitions correctly within a mathematical argument
• Apply the mathematical notions of invariant and isomorphism in order to discriminate and classify geometric objects

Class Test
Assessment Type 1: Quiz/Test
Indicative Time on Task 2: 6 hours
Due: Week 9
Weighting: 15%

This will be an invigilated test held in class and cover both the geometry and the topology components of the unit.
On successful completion you will be able to:

- Formulate and model practical and abstract problems in mathematical terms using methods from geometry and topology
- Apply concepts and techniques of geometry and topology to practical and abstract problems
- Use axioms and definitions correctly within a mathematical argument
- Apply the mathematical notions of invariant and isomorphism in order to discriminate and classify geometric objects

Assignment 2

Assessment Type: Problem set
Indicative Time on Task: 5 hours
Due: Week 11
Weighting: 15%

The assignments will include questions from both the topology and the geometry component of the unit.

On successful completion you will be able to:

- Formulate and model practical and abstract problems in mathematical terms using methods from geometry and topology
- Apply concepts and techniques of geometry and topology to practical and abstract problems
- Use axioms and definitions correctly within a mathematical argument
- Apply the mathematical notions of invariant and isomorphism in order to discriminate and classify geometric objects

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.

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 (beginning in Week 1): There is one two-hour lecture each week.

SGTA classes (beginning in Week 2): Students must register in and attend one one-hour class per week.

Enrolment can be managed using eStudent at: https://students.mq.edu.au/support/technology/systems/estudent.

Suggested textbooks
The following textbook is useful as a supplementary resource, for additional questions and explanations. It is available from the Macquarie University library:

The Four Pillars of Geometry by John Stillwell

Additional lecture notes are here:

Chris Cooper’s Note on Geometry at https://coopersnotes.net/third_geometry%20vol%202.html

Chris Cooper’s Note on Topology at https://coopersnotes.net/third_topology.html

Communication
We will communicate with you via your university email or through announcements on iLearn. Queries to convenors can either be placed on the iLearn discussion board or sent to your lecturers [or UNITCODE@mq.edu.au] from your university email address.

COVID Information
For the latest information on the University’s response to COVID-19, please refer to the Coronavirus infection page on the Macquarie website: https://www.mq.edu.au/about/coronavirus-faqs. Remember to check this page regularly in case the information and requirements change during semester. If there are any changes to this unit in relation to COVID, these will be communicated via iLearn.

Unit Schedule
Week 1: Geometry: Euclidean geometry in the complex plane
Week 2: Topology: Topological spaces
Week 3: Geometry: Affine functions
Week 4: Topology: Surfaces and Surgery
Week 5: Geometry: Affine geometry
Week 6: Topology: Graphs on Surfaces, Graphs and Map Colouring
Week 7: Geometry: Projective geometry
Week 8: Topology: Knots and Links
Week 9: Geometry: Projective geometry

Week 10: Topology: The Alexander number of a Knot, The Alexander Group of a Knot

Week 11: Geometry: Constructions in geometry and number fields


Week 13: Revisions

**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
- 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). 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](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

**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 Advocacy provides independent advice on MQ policies, procedures, and processes

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/.

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 from Previous Offering**

We value student feedback to be able to continually improve the way we offer our units. As such we encourage students to provide constructive feedback via student surveys, to the teaching staff directly, or via the FSE Student Experience & Feedback link in the iLearn page. As such, no change to the delivery of the unit is planned, however we will continue to strive to improve the level of support and the level of student engagement.

Unit information based on version 2024.01R of the [Handbook](https://unitguides.mq.edu.au/unit_offerings/164132/unit_guide/print)