



MATH3907

Algebra IIIA

Session 1, In person-scheduled-weekday, North Ryde 2024

School of Mathematical and Physical Sciences

Contents

<u>General Information</u>	2
<u>Learning Outcomes</u>	2
<u>General Assessment Information</u>	3
<u>Assessment Tasks</u>	4
<u>Delivery and Resources</u>	6
<u>Unit Schedule</u>	7
<u>Policies and Procedures</u>	7

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General Information

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Credit points
10

Prerequisites
130cp including (MATH2010 or MATH235)

Corequisites
MATH3900 or MATH3901 or MATH3905 or MATH300 or MATH331 or MATH335

Co-badged status

Unit description
This unit develops the basic ideas of modern abstract algebra by concentrating on the many facets of group theory and its applications. Groups are used to describe symmetries of physical and mathematical objects. The course begins by introducing their basic theory, including generators and relations, Lagrange's theorem, and quotient groups. These ideas are applied to topics such as geometry and the possibility or impossibility of solving polynomial equations.

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 a well-developed knowledge of algebraic principles, concepts and calculation techniques as occur within Group Theory.

ULO2: Apply relevant knowledge to problems in group theory and other fields in which group theory is used; through sustained logic, with clearly presented and justified mathematical arguments.

ULO3: Synthesize multiple ideas and techniques of group theory in order to solve a larger scale problem.

ULO4: Present mathematical ideas, arguments and findings in a professional manner as appropriate to the intended audience.

General Assessment Information

Requirements to Pass this Unit

To pass this unit you must:

- Achieve a total mark equal to or greater than 50%.

Hurdle Requirements

There are no hurdles in this unit.

Late Assessment Submission Penalty

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark of the task) will be applied for each day a written report or presentation/assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted.

The submission time for all uploaded assessments is 11:55 pm. A 1-hour grace period will be provided to students who experience a technical concern. For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, please apply for Special Consideration.

Assessments where Late Submissions will be accepted

- Assignment 1, Assignment 2, and Project – YES, Standard Late Penalty applies.

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 assignments or

project in this unit on time, please inform the convenor and submit a Special Consideration request through ask.mq.edu.au.

Assessment Tasks

Name	Weighting	Hurdle	Due
Final Exam	50%	No	Final exam period
Project	20%	No	Week 13
Assignment 1	15%	No	Week 5
Assignment 2	15%	No	Week 11

Final Exam

Assessment Type ¹: Examination

Indicative Time on Task ²: 15 hours

Due: **Final exam period**

Weighting: **50%**

This will be an invigilated exam, held during the final exam period.

On successful completion you will be able to:

- Demonstrate a well-developed knowledge of algebraic principles, concepts and calculation techniques as occur within Group Theory.
- Apply relevant knowledge to problems in group theory and other fields in which group theory is used; through sustained logic, with clearly presented and justified mathematical arguments.
- Present mathematical ideas, arguments and findings in a professional manner as appropriate to the intended audience.

Project

Assessment Type ¹: Project

Indicative Time on Task ²: 20 hours

Due: **Week 13**

Weighting: **20%**

This project gives students the opportunity to apply the knowledge gained in the unit to a larger scale mathematical problem than the short questions typical in assignments.

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- Apply relevant knowledge to problems in group theory and other fields in which group theory is used; through sustained logic, with clearly presented and justified mathematical arguments.
- Synthesize multiple ideas and techniques of group theory in order to solve a larger scale problem.
- Present mathematical ideas, arguments and findings in a professional manner as appropriate to the intended audience.

Assignment 1

Assessment Type ¹: Problem set

Indicative Time on Task ²: 12 hours

Due: **Week 5**

Weighting: **15%**

A collection of problems relevant to the material taught during weeks 1–5 of the teaching session.

On successful completion you will be able to:

- Demonstrate a well-developed knowledge of algebraic principles, concepts and calculation techniques as occur within Group Theory.
- Apply relevant knowledge to problems in group theory and other fields in which group theory is used; through sustained logic, with clearly presented and justified mathematical arguments.
- Present mathematical ideas, arguments and findings in a professional manner as appropriate to the intended audience.

Assignment 2

Assessment Type ¹: Problem set

Indicative Time on Task ²: 12 hours

Due: **Week 11**

Weighting: **15%**

A collection of problems relevant to the material taught during weeks 5–10 of the teaching session.

On successful completion you will be able to:

- Demonstrate a well-developed knowledge of algebraic principles, concepts and calculation techniques as occur within Group Theory.
- Apply relevant knowledge to problems in group theory and other fields in which group theory is used; through sustained logic, with clearly presented and justified mathematical arguments.
- Present mathematical ideas, arguments and findings in a professional manner as appropriate to the intended audience.

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

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.

Textbook

There is no required textbook but see iLearn for various recommended resources.

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 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	Topic	Assessments due
1	Groups: definition and examples.	
2	Permutation groups.	
3	Generators, presentations, and subgroups	
4	Cosets and Lagrange's theorem.	
5	Homomorphisms.	Assignment 1
6	Group quotients and normal subgroups.	
7	Modular arithmetic	
8	Rings and fields	
Recess		
9	Polynomials	
10	Isomorphisms of rings and quotient rings	
11	Field extensions	Assignment 2
12	Galois Theory	
13	Revision, catchup	Project

The timing of the topics is indicative, and may need to be changed. Any such changes will be communicated via iLearn.

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 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.

Unit information based on version 2024.01R of the [Handbook](#)