



# MATH337

## Algebra IIIA

S1 Day 2014

*Mathematics*

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## General Information

Unit convenor and teaching staff

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Unit Convenor

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Credit points

3

Prerequisites

39cp including MATH235

Corequisites

Co-badged status

Unit description

This unit develops the basic ideas of modern abstract algebra by concentrating on the many facets of group theory. As well as the standard material leading to the isomorphism theorems, we cover combinational aspects such as presentations of groups, the Todd-Coxeter algorithm, and subgroups of free groups via groupoids. Also studied are permutation groups, finitely generated abelian groups, soluble groups and group representations. The unit is especially suitable for students majoring in the theoretical aspects of physics or computing science.

## 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:

- demonstrate a well developed knowledge of algebraic principles, concepts and techniques. Integrate and synthesise knowledge from multiple and diverse mathematical areas to develop a sophisticated understanding of group theory.
- demonstrate a capacity to apply knowledge to an unstructured, authentic problem in

group theory; with evidence of sustained logical, clearly presented and justified mathematical arguments.

present mathematical ideas, arguments and findings in a professional manner

appropriate to the intended audience

engage in mathematical work in a manner consistent with professional and ethical standards.

## Assessment Tasks

Name	Weighting	Due
<u>Assignments</u>	24%	see unit website
<u>Project</u>	16%	see unit website
<u>Final examination</u>	60%	University examination period

### Assignments

Due: **see unit website**

Weighting: **24%**

8 regular homework assignments

On successful completion you will be able to:

- demonstrate a well developed knowledge of algebraic principles, concepts and techniques. Integrate and synthesise knowledge from multiple and diverse mathematical areas to develop a sophisticated understanding of group theory.
- present mathematical ideas, arguments and findings in a professional manner appropriate to the intended audience
- engage in mathematical work in a manner consistent with professional and ethical standards.

### Project

Due: **see unit website**

Weighting: **16%**

Substantial peice of individual work, requiring the integration of a broad range of mathematical ideas developed in this and preceeding units.

A key component of this task is the demonstration of the skills developed to communicate mathematical ideas in a manner appropriate to the intended audience.

On successful completion you will be able to:

- demonstrate a well developed knowledge of algebraic principles, concepts and techniques. Integrate and synthesise knowledge from multiple and diverse mathematical areas to develop a sophisticated understanding of group theory.
- demonstrate a capacity to apply knowledge to an unstructured, authentic problem in group theory; with evidence of sustained logical, clearly presented and justified mathematical arguments.
- present mathematical ideas, arguments and findings in a professional manner appropriate to the intended audience
- engage in mathematical work in a manner consistent with professional and ethical standards.

## Final examination

Due: **University examination period**

Weighting: **60%**

On successful completion you will be able to:

- demonstrate a well developed knowledge of algebraic principles, concepts and techniques. Integrate and synthesise knowledge from multiple and diverse mathematical areas to develop a sophisticated understanding of group theory.
- present mathematical ideas, arguments and findings in a professional manner appropriate to the intended audience

## Delivery and Resources

**Text:**

CDHC Cooper: Groups, presentations and representations

Available at <http://maths.science.mq.edu.au/ccoopers/Groups/>

## Unit Schedule

see unit website <http://maths.science.mq.edu.au/math337s114/outline.html>

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy [http://mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

Assessment Policy <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Grievance Management Policy [http://mq.edu.au/policy/docs/grievance\\_management/policy.html](http://mq.edu.au/policy/docs/grievance_management/policy.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html) *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of 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/support/student\\_conduct/](https://students.mq.edu.au/support/student_conduct/)

## 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://informatics.mq.edu.au/help/>.

When using the University's IT, you must adhere to the [Acceptable Use Policy](#). The policy applies to all who connect to the MQ network including students.

## Graduate Capabilities

### Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

#### Learning outcomes

- demonstrate a capacity to apply knowledge to an unstructured, authentic problem in group theory; with evidence of sustained logical, clearly presented and justified mathematical arguments.
- present mathematical ideas, arguments and findings in a professional manner appropriate to the intended audience
- engage in mathematical work in a manner consistent with professional and ethical standards.

#### Assessment tasks

- Assignments
- Project

### Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

#### Learning outcome

- engage in mathematical work in a manner consistent with professional and ethical standards.

### Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able

to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

## **Learning outcomes**

- demonstrate a well developed knowledge of algebraic principles, concepts and techniques. Integrate and synthesise knowledge from multiple and diverse mathematical areas to develop a sophisticated understanding of group theory.
- present mathematical ideas, arguments and findings in a professional manner appropriate to the intended audience

## **Assessment tasks**

- Assignments
- Project
- Final examination

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

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

## **Learning outcomes**

- demonstrate a well developed knowledge of algebraic principles, concepts and techniques. Integrate and synthesise knowledge from multiple and diverse mathematical areas to develop a sophisticated understanding of group theory.
- demonstrate a capacity to apply knowledge to an unstructured, authentic problem in group theory; with evidence of sustained logical, clearly presented and justified mathematical arguments.

## **Assessment tasks**

- Assignments
- Project
- Final examination

## Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

### Learning outcomes

- demonstrate a well developed knowledge of algebraic principles, concepts and techniques. Integrate and synthesise knowledge from multiple and diverse mathematical areas to develop a sophisticated understanding of group theory.
- demonstrate a capacity to apply knowledge to an unstructured, authentic problem in group theory; with evidence of sustained logical, clearly presented and justified mathematical arguments.

### Assessment tasks

- Assignments
- Project
- Final examination

## Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

### Learning outcomes

- demonstrate a well developed knowledge of algebraic principles, concepts and techniques. Integrate and synthesise knowledge from multiple and diverse mathematical areas to develop a sophisticated understanding of group theory.
- demonstrate a capacity to apply knowledge to an unstructured, authentic problem in group theory; with evidence of sustained logical, clearly presented and justified mathematical arguments.
- present mathematical ideas, arguments and findings in a professional manner appropriate to the intended audience



## Assessment task

- Project

## Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

## Learning outcomes

- demonstrate a capacity to apply knowledge to an unstructured, authentic problem in group theory; with evidence of sustained logical, clearly presented and justified mathematical arguments.
- present mathematical ideas, arguments and findings in a professional manner appropriate to the intended audience

## Assessment tasks

- Assignments
- Project
- Final examination

## Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

## Learning outcome

- engage in mathematical work in a manner consistent with professional and ethical standards.

## Assessment task

- Project

## Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

### Learning outcome

- engage in mathematical work in a manner consistent with professional and ethical standards.

### Extra requirements

Satisfactory performance on supervised assessment tasks, such as tests and the final exam, is necessary to pass this unit. If there is a significant difference between a student's marks on supervised assessment tasks and on unsupervised assessment tasks, the scaling of these tasks may be adjusted when determining the final grade, to reflect more appropriately that student's performance on supervised tasks.