



UNSW Course Outline

MATH3711 Higher Algebra - 2024

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General Course Information

Course Code : MATH3711

Year : 2024

Term : Term 1

Teaching Period : T1

Is a multi-term course? : No

Faculty : Faculty of Science

Academic Unit : School of Mathematics & Statistics

Delivery Mode : In Person

Delivery Format : Standard

Delivery Location : Kensington

Campus : Sydney

Study Level : Undergraduate

Units of Credit : 6

Useful Links

[Handbook Class Timetable](#)

Course Details & Outcomes

Course Description

In Higher Algebra we examine some of the basic notions of modern algebra that arose in the late 19th and early 20th century. The most fundamental notion is that of a group, which is how mathematicians study symmetry. In this course groups are studied in detail both from an abstract point of view and also to study symmetry in geometry. The other important concept

studied is that of a ring. The algebra of adding and multiplying matrices has many similarities with the algebra of numbers. The notion of rings generalises both these two examples. The course examines factorisation theory for certain rings.

This course is one of the three core third year higher pure mathematics courses and is a pre-requisite for pure mathematics students progressing to Honours. In particular, it introduces the axiomatic language and framework that underpins modern mathematics. The delivery will primarily be through lectures with some problem solving tutorials.

Course Aims

The aim of this course is to introduce students to the language and basic concepts of modern algebra. The course includes foundational material essential for all further studies in pure mathematics. Proofs will feature heavily in both classes and assessments, so another aim will be to develop the skill of writing sound mathematical proofs.

Relationship to Other Courses

This course is double-badged with MATH5706

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Use the general theory of groups, rings and fields to answer specific problems in algebra.
CLO2 : Write defect-free proofs in algebra.
CLO3 : Describe mathematical content logically so that any mathematician reading it can easily verify its veracity.

Course Learning Outcomes	Assessment Item
CLO1 : Use the general theory of groups, rings and fields to answer specific problems in algebra.	<ul style="list-style-type: none">• Mid-Term Test• Final exam• Assignment• Tutorial Presentation
CLO2 : Write defect-free proofs in algebra.	<ul style="list-style-type: none">• Mid-Term Test• Final exam• Assignment• Tutorial Presentation
CLO3 : Describe mathematical content logically so that any mathematician reading it can easily verify its veracity.	<ul style="list-style-type: none">• Mid-Term Test• Final exam• Assignment• Tutorial Presentation

Learning and Teaching Technologies

Moodle - Learning Management System

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Mid-Term Test Assessment Format: Individual	20%	Start Date: week 7 in class Due Date: Not Applicable
Final exam Assessment Format: Individual	60%	Start Date: exam period Due Date: Not Applicable
Assignment Assessment Format: Individual	15%	Start Date: week 1 Due Date: last lecture of week 3
Tutorial Presentation Assessment Format: Group	5%	Start Date: week 2 Due Date: due weekly in tutorial

Assessment Details

Mid-Term Test

Assessment Overview

You will complete a 40 min in class test during Week 7 assessing knowledge of material in lectures on group theory (weeks 1-5). Questions will follow closely the lecture material and problem set questions covered in tutorials.

Feedback will be provided to you within two weeks of completing the test.

Course Learning Outcomes

- CL01 : Use the general theory of groups, rings and fields to answer specific problems in algebra.
- CL02 : Write defect-free proofs in algebra.
- CL03 : Describe mathematical content logically so that any mathematician reading it can easily verify its veracity.

Assessment Length

40 minutes

Final exam

Assessment Overview

The final exam is designed to summarise your learning and problem-solving skills on all topics delivered across the term, including material from lectures, tutorials and supplementary materials. The exam is typically 2hrs. Questions will follow closely lecture material and problem set questions. Details will be confirmed during the course. The examination will occur during the official university examination period. Feedback is available through inquiry with the course convenor.

Course Learning Outcomes

- CL01 : Use the general theory of groups, rings and fields to answer specific problems in algebra.
- CL02 : Write defect-free proofs in algebra.
- CL03 : Describe mathematical content logically so that any mathematician reading it can easily verify its veracity.

Assessment Length

2 hours

Assignment

Assessment Overview

In week 3, you will submit an assignment consisting of approximately six questions covering material in the first two weeks of lectures. Questions will focus on proofs rather than computations. The assignment will exercise analytical skills requiring you to ensure all necessary arguments are properly verified and presented in a clear and logical manner. You will receive written feedback and marks within 10 working days after the submission deadline.

Course Learning Outcomes

- CL01 : Use the general theory of groups, rings and fields to answer specific problems in algebra.
- CL02 : Write defect-free proofs in algebra.
- CL03 : Describe mathematical content logically so that any mathematician reading it can easily verify its veracity.

Assessment information

Standard late submission penalties apply.

Tutorial Presentation

Assessment Overview

This assessment focuses on oral communication of mathematics and entails presenting solutions to problem set questions in class. Students will form teams of 3-4 and every week, prepare a 5-7 minute presentation answering a problem set question. Not all teams will present every week, but it is expected that teams will present at least twice during the term.

Course Learning Outcomes

- CL01 : Use the general theory of groups, rings and fields to answer specific problems in algebra.
- CL02 : Write defect-free proofs in algebra.
- CL03 : Describe mathematical content logically so that any mathematician reading it can easily verify its veracity.

Assessment Length

5-7 minute presentation a few times per term

General Assessment Information

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 12 February - 18 February	Lecture	Basic group theory and examples.
Week 2 : 19 February - 25 February	Lecture	Cosets, quotient groups and homomorphisms.
Week 3 : 26 February - 3 March	Lecture	Isomorphism theorems
	Assessment	Assignment due at the end of the last lecture.
Week 4 : 4 March - 10 March	Lecture	Group actions.
Week 5 : 11 March - 17 March	Lecture	Basic ring theory.
Week 7 : 25 March - 31 March	Lecture	Ring constructions
	Assessment	In-class test.
Week 8 : 1 April - 7 April	Lecture	Factorisation theory.
Week 9 : 8 April - 14 April	Lecture	Field theory
Week 10 : 15 April - 21 April	Lecture	Ruler and compass constructions.

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Resources

Recommended Resources

Artin's "Algebra"

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
	Daniel Chan					No	Yes

Other Useful Information

Academic Information

Upon your enrolment at UNSW, you share responsibility with us for maintaining a safe, harmonious and tolerant University environment.

You are required to:

- Comply with the University’s conditions of enrolment.
- Act responsibly, ethically, safely and with integrity.
- Observe standards of equity and respect in dealing with every member of the UNSW

community.

- Engage in lawful behaviour.
- Use and care for University resources in a responsible and appropriate manner.
- Maintain the University's reputation and good standing.

For more information, visit the [UNSW Student Code of Conduct Website](https://student.unsw.edu.au/conduct).

Academic Honesty and Plagiarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.

Further information about referencing styles can be located at <https://student.unsw.edu.au/referencing>

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage. At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity, plagiarism and the use of AI in assessments can be located at:

- The [Current Students site](https://student.unsw.edu.au/current-students),
- The [ELISE training site](https://student.unsw.edu.au/elise), and
- The [Use of AI for assessments](https://student.unsw.edu.au/use-of-ai) site.

The Student Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: <https://student.unsw.edu.au/conduct>

Submission of Assessment Tasks

Penalty for Late Submissions

UNSW has a standard late submission penalty of:

- 5% per day,
- for all assessments where a penalty applies,
- capped at five days (120 hours) from the assessment deadline, after which a student cannot submit an assessment, and
- no permitted variation.

Any variations to the above will be explicitly stated in the Course Outline for a given course or assessment task.

Students are expected to manage their time to meet deadlines and to request extensions as early as possible before the deadline.

Special Consideration

If circumstances prevent you from attending/completing an assessment task, you must officially apply for special consideration, usually within 3 days of the sitting date/due date. You can apply by logging onto myUNSW and following the link in the My Student Profile Tab. Medical documentation or other documentation explaining your absence must be submitted with your application. Once your application has been assessed, you will be contacted via your student email address to be advised of the official outcome and any actions that need to be taken from there. For more information about special consideration, please visit: <https://student.unsw.edu.au/special-consideration>

Important note: UNSW has a “fit to sit/submit” rule, which means that if you sit an exam or submit a piece of assessment, you are declaring yourself fit to do so and cannot later apply for Special Consideration. This is to ensure that if you feel unwell or are faced with significant circumstances beyond your control that affect your ability to study, you do not sit an examination or submit an assessment that does not reflect your best performance. Instead, you should apply for Special Consideration as soon as you realise you are not well enough or are otherwise unable to sit or submit an assessment.

Faculty-specific Information

Additional support for students

- [The Current Students Gateway](#)
- [Student Support](#)
- [Academic Skills and Support](#)
- [Student Wellbeing, Health and Safety](#)
- [Equitable Learning Services](#)
- [UNSW IT Service Centre](#)
- Science EDI Student [Initiatives](#), [Offerings](#) and [Guidelines](#)

School-specific Information

School of Mathematics and Statistics and UNSW Policies

The School of Mathematics and Statistics has adopted a number of policies relating to enrolment, attendance, assessment, plagiarism, cheating, special consideration etc. These are in addition to the Policies of The University of New South Wales. Individual courses may also adopt other policies in addition to or replacing some of the School ones. These will be clearly notified in the Course Initial Handout and on the Course Home Pages on the Maths Stats web site. Students in courses run by the School of Mathematics and Statistics should be aware of the School and Course policies by reading the appropriate pages on the web site starting at: [The School of Mathematics and Statistics assessment policies](#)

The School of Mathematics and Statistics will assume that all its students have read and understood the School policies on the above pages and any individual course policies on the Course Initial Handout and Course Home Page. Lack of knowledge about a policy will not be an excuse for failing to follow the procedure in it.

Special Consideration - Short Extension Policy

The School of Mathematics and Statistics has carefully reviewed its range of assignments and projects to determine their suitability for automatic short extensions as set out by the UNSW Short Extension Policy. Upon comprehensive examination of our course offerings that incorporate these types of assessments, we have concluded that our current deadline structures already accommodate the possibility of unexpected circumstances that may lead students to require additional days for submission. Consequently, the School of Mathematics and Statistics has decided to universally opt out of the Short Extension provision for all its courses, having pre-emptively integrated flexibility into our assessment deadlines. The decision is subject to revision in response to the introduction of new course offerings. Students may still apply for Special Consideration via the usual procedures.

Computing Lab

The main computing laboratory is room G012 of the Anita B. Lawrence Centre (formerly Red Centre). You can get to this lab by entering the building through the main entrance to the School of Mathematics (on the Mezzanine Level) and then going down the stairs to the Ground Level. A second smaller lab is Room M020, located on the mezzanine level through the glass door (and along the corridor) opposite the School's entrance.

For more information, including opening hours, see the [computing facilities webpage](#). Remember that there will always be unscheduled periods when the computers are not working because of

equipment problems and that this is not a valid excuse for not completing assessments on time.

School Contact Information

School Contact Information

Please visit the [School of Mathematics and Statistics website](#) for a range of information.

For information on Courses, please go to "Student life & resources" and either Undergraduate and/or Postgraduate and respective "Undergraduate courses" and "Postgraduate courses" for information on all course offerings.

All school policies, forms and help for students can be located by going to the "Student Services" within "Student life & resources" page. We also post notices in "Student noticeboard" for your information. Please familiarise yourself with the information found in these locations. If you cannot find the answer to your queries on the web you are welcome to contact the Student Services Office directly.

Undergraduate

E: ug.mathsstats@unsw.edu.au

P: 9385 7011 or 9385 7053

Postgraduate

E: pg.mathsstats@unsw.edu.au

P: 9385 7053

Should we need to contact you, we will use your official UNSW email address of in the first instance. **It is your responsibility to regularly check your university email account. Please use your UNSW student email and state your student number in all emails to us.**