UNSW SCIENCE

School of Maths and Statistics

Course outline

MATH3711 Higher Algebra

MATH5706 Modern Algebra

Term 1, 2023

Cricos Provider Code: 00098G

Staff

Position	Name	Email	Room
Lecturer-in-charge	Prof Daniel Chan	danielc@unsw.edu.au	RC-4104

Please refer to your Timetable on MyUNSW for your Lecture/Seminar Tut, Lab enrolment days and times. Timetable MATH3711 http://timetable.unsw.edu.au/2023/MATH3711.html
Timetable MATH5706 weblink: http://timetable.unsw.edu.au/2023/MATH5706.html

Administrative Contacts

Please visit the School of Mathematics and Statistics website for a range of information on School Policies, Forms and Help for Students.

For information on Courses, please go to "Current Students" and either Undergraduate and/or Postgraduate", Course Homepage" for information on all course offerings,

The "Student Notice Board" can be located by going to the "Current Students" page; Notices are posted regularly for your information here. Please familiarise yourself with the information found in these locations. The School web page is: https://www.maths.unsw.edu.au

If you cannot find the answer to your queries on the web you are welcome to contact the Student Services Office directly.

By email	Undergraduate	ug.mathsstats@unsw.edu.au
	Postgraduate	pg.mathsstats@unsw.edu.au
By phone:	9385 7053 or 9385 7011	

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 state your student number in all emails.**

Course Information

Assumed knowledge / Pre-Requisites MATH3711: 12 units of credit in Level II Mathematics courses with an average mark of at least 70, including MATH2601 or MATH2501(credit), or permission from the Head of Department

Exclusions MATH3711: MATH3521, MATH3710, MATH3720, MATH3740

Exclusions MATH5706: MATH3711 (MATH3711 jointly taught with MATH5706)

Course Aims

This course introduces the basic language and ideas of modern algebra, the two main concepts being that of a group and that of a ring. Groups are the vehicle through which mathematicians study symmetry. The data used to define them involves one algebraic operation, group multiplication. Rings on the other hand have two algebraic operations, addition and multiplication, much as you find with ordinary numbers.

Historically, solving polynomial equations was a major driving force for the development of group theory, while number theory was the major driving force for ring theory. In particular, the course will look at the role rings played in attempts to prove Fermat's last theorem in the 19th century, and to study groups through representation theory in the early 20th century.

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.

Assessment and Deadlines

Assessment	Week	Weighting %	Due date if applicable
Assignment 1	Week 3	15%	Due week 3
Class Test	Week 5 or 7	25%	In week 5 or 7
Final Exam	Final Exam period	60%	

Late Submission of Assessment Tasks

A late penalty of 5% of the awarded mark will be applied per day or part day any assessment task is submitted more than 1 hour late. (Where "late" in this context means after any extensions granted for Special Consideration or Equitable Learning Provisions.) For example, an assessment task that was awarded 75% would be given 65% if it was 1-2 days late. Any assessment task submitted after 5 days will not be accepted.

Note that the penalty does not apply to

- Assessment tasks worth less than 5% of the total course mark, e.g. weekly quizzes, weekly class participation, or weekly homework tasks.
- Examinations and examination-style class tests
- Pass/Fail Assessments

Course Learning Outcomes (CLO) MATH3711

1. Demonstrate a thorough understanding of the basic theory of groups, rings and fields.
2. Increase their abilities in writing proofs in good mathematical style.

Course Learning Outcomes (CLO) MATH5706

1. Demonstrate an understanding of the basic theory of groups, rings and fields.
2. Present mathematical information effectively in both written and verbal formats.
3. Demonstrate an ability to apply abstract mathematical theory to concrete and theoretical problems in algebra.

Course Schedule

The course will include material taken from some of the following topics. This is should only serve as a guide as it is not an extensive list of the material to be covered and the timings are approximate. The course content is ultimately defined by the material covered in lectures.

Weeks	Topic	Reading (if applicable)
1	Permutation Groups; Examples of groups	Refer to Moodle Lecture notes
2	Group Homomorphisms; Lagrange	
3	Isomorphism Theorems; Direct sums of groups	
4	Classification of cyclic groups; isometry groups	
5	Group Actions	
7	Rings	
8	Factorisation in commutative domains	
9	Fields, finite fields	
10	Extension of fields; Applications.	

Moodle

Log in to Moodle to find announcements, general information, notes, lecture slide, classroom tutorial and assessments etc. https://moodle.telt.unsw.edu.au

School 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 Maths Stats web site starting at:
https://www.maths.unsw.edu.au/currentstudents/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.

Academic Integrity and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW staff and students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

The **UNSW Student Code** provides a framework for the standard of conduct expected of UNSW students with respect to their academic integrity and behaviour. It outlines the primary obligations of students and directs staff and students to the Code and related procedures.

In addition, it is important that students understand that it is not permissible to buy essay/writing services from third parties as the use of such services constitutes plagiarism because it involves using the words or ideas of others and passing them off as your own. Nor is it permissible to sell copies of lecture or tutorial notes as students do not own the rights to this intellectual property.

If a student breaches the Student Code with respect to academic integrity, the University may take disciplinary action under the **Student Misconduct Procedure**.

The UNSW Student Code and the Student Misconduct Procedure can be found at:
https://student.unsw.edu.au/plagiarism

An online Module "Working with Academic Integrity" (https://student.unsw.edu.au/aim) is a six-lesson interactive self-paced Moodle module exploring and explaining all of these terms and placing them into your learning context. It will be the best one-hour investment you've ever made.

Plagiarism

Plagiarism is presenting another person's work or ideas as your own. Plagiarism is a serious breach of ethics at UNSW and is not taken lightly. So how do you avoid it? A one-minute video for an overview of how you can avoid plagiarism can be found https://student.unsw.edu.au/plagiarism.

Additional Support

ELISE (Enabling Library and Information Skills for Everyone)

ELISE is designed to introduce new students to studying at UNSW.

Completing the ELISE tutorial and quiz will enable you to:

- analyse topics, plan responses and organise research for academic writing and other assessment tasks
- effectively and efficiently find appropriate information sources and evaluate relevance to your needs
- use and manage information effectively to accomplish a specific purpose
- better manage your time
- understand your rights and responsibilities as a student at UNSW
- be aware of plagiarism, copyright, UNSW Student Code of Conduct and Acceptable Use of UNSW ICT Resources Policy
- be aware of the standards of behaviour expected of everyone in the UNSW community
- locate services and information about UNSW and UNSW Library

Some of these areas will be familiar to you, others will be new. Gaining a solid understanding of all the related aspects of ELISE will help you make the most of your studies at UNSW.

The *ELISE* training webpages:

https://subjectguides.library.unsw.edu.au/elise/aboutelise

Equitable Learning Services (ELS)

If you suffer from a chronic or ongoing illness that has, or is likely to, put you at a serious disadvantage, then you should contact the Equitable Learning Services (previously known as SEADU) who provide confidential support and advice.

They assist students:

- living with disabilities
- with long- or short-term health concerns and/or mental health issues
- who are primary carers
- from low SES backgrounds
- of diverse genders, sexes and sexualities
- from refugee and refugee-like backgrounds
- from rural and remote backgrounds

- who are the first in their family to undertake a bachelor-level degree.

Their web site is: https://student.unsw.edu.au/els/services

Equitable Learning Services (ELS) may determine that your condition requires special arrangements for assessment tasks. Once the School has been notified of these, we will make every effort to meet the arrangements specified by ELS.

Additionally, if you have suffered significant misadventure that affects your ability to complete the course, please contact your Lecturer-in-charge in the first instance.

Academic Skills Support and the Learning Centre

The Learning Centre offers academic support programs to all students at UNSW Australia. We assist students to develop approaches to learning that will enable them to succeed in their academic study. For further information on these programs please go to:

http://www.lc.unsw.edu.au/services-programs

Applications for Special Consideration for Missed Assessment

Please adhere to the Special Consideration Policy and Procedures provided on the web page below when applying for special consideration.

https://student.unsw.edu.au/special-consideration

Please note that the application is not considered by the Course Authority, it is considered by a centralised team of staff at the Nucleus Student Hub.

The School will contact you (via student email account) after special consideration has been granted to reschedule your missed assessment, for a *lab test or paper-based test* only.

For applications for special consideration for *assignment extensions*, please note that the new submission date and/or outcome will be communicated through the special consideration web site only, no communication will be received from the School.

For Dates on Final Term Exams and Supplementary Exams please check the “Key Dates for Exams” ahead of time to avoid booking holidays or work obligations.

https://student.unsw.edu.au/exam-dates

If you believe your application for Special Consideration has not been processed, you should email specialconsideration@unsw.edu.au immediately for advice.

Course Evaluation and Development (MyExperience)

Student feedback is very important to continual course improvement. This is demonstrated within the School of Mathematics and Statistics by the implementation of the UNSW online student survey *myExperience*, which allows students to evaluate their learning experiences in an anonymous way. *myExperience* survey reports are produced for each survey. They are released to staff after all student assessment results are finalised and released to students. Course convenor will use the feedback to make ongoing improvements to the course.