UNSW Course Outline

MATH2400 Finite Mathematics - 2024

Published on the 12 May 2024

General Course Information

Course Code : MATH2400
Year : 2024
Term : Term 2
Teaching Period : T2
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 : 3

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

This is an introduction to those areas of Mathematics which (amongst other things) underpin important areas of computing. The main topics are integer and modular arithmetic (including tests for primality of integers), polynomial algebra (including factorisation of polynomials and

construction of new fields), and an introduction to cryptography and error-correcting codes.

The course is delivered through a series of lectures and tutorials, along with weekly self-paced online lessons. All topics are taught from first principles, but due to the relatively fast pace of delivery, MATH1081 – Discrete Mathematics is recommended prior knowledge. The course provides a strong foundation for students intending to study higher-level mathematics or computer science, and is a core course for the Bachelor of Engineering (Honours) (Software) degree.

Since the introduction of digital computers, the renewed importance of discrete and thus finite theory in mathematics has become apparent. For this reason, MATH2400 – Finite Mathematics should prove useful to future Computer Scientists and Software Engineers while at the same time providing Mathematics students with an introduction to ideas in Number Theory, Finite Fields, Cryptography, and Algebraic Coding Theory. The related course MATH3411 – Information, Codes and Ciphers develops some of these ideas in greater depth.

Course Aims

The aim of this course is to provide students with a foundational knowledge of key areas in Finite Mathematics, introducing important concepts in Number Theory, Finite Fields, Cryptography, and Algebraic Coding Theory.

Relationship to Other Courses

Prerequisite: MATH1081 or MATH1231 or MATH1241 or MATH1251 or DPST1014.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Solve problems in number theory involving divisibility, congruences, and finite fields.
CLO2 : Apply finite field arithmetic in cryptography, coding, number theory, and theoretical computer science.
CLO3 : Communicate mathematical ideas effectively and clearly in written form.

Course Learning Outcomes	Assessment Item
CLO1 : Solve problems in number theory involving divisibility, congruences, and finite fields.	• Lab tests • Examination • Weekly Numbas Exercises
CLO2 : Apply finite field arithmetic in cryptography, coding, number theory, and theoretical computer science.	• Lab tests • Examination • Weekly Numbas Exercises
CLO3 : Communicate mathematical ideas effectively and clearly in written form.	• Examination

Learning and Teaching Technologies

Moodle - Learning Management System | Numbas | Echo 360

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Lab tests Assessment Format: Individual	40%	Due Date: Week 4 and Week 9
Examination Assessment Format: Individual	50%	Due Date: Exam Period
Weekly Numbas Exercises Assessment Format: Individual	10%	Start Date: Not Applicable Due Date: Not Applicable

Assessment Details

Lab tests

Assessment Overview

The lab tests are two assessments using the Numbas platform, held in the computer labs in

Week 4 and Week 9.
Each lab test is worth 20% of your final grade, with Lab Test 1 assessing the topics covered in Weeks 1-3, and Lab Test 2 assessing the topics covered in Weeks 4-8. You will answer a bank of randomly-generated questions under timed conditions (40 minutes). You will have access to the bank of questions for each lab test at least one week in advance, and will have unlimited practice attempts available before sitting the timed version.

Course Learning Outcomes

- CLO1 : Solve problems in number theory involving divisibility, congruences, and finite fields.
- CLO2 : Apply finite field arithmetic in cryptography, coding, number theory, and theoretical computer science.

Detailed Assessment Description

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Assessment Length

40 minutes

Examination

Assessment Overview

The final examination is designed for you to demonstrate a mastery of the course content. It is a 2-hour exam comprised of multiple-part questions addressing content from all topics taught in the course. Typical question types include those expecting short-form numeric or algebraic answers as well as long-form explanations or proofs. Marks are awarded not just for correct final answers, but also for providing valid working and/or explanations. The exam is held in the standard examination period, and you will be allowed to review your answers upon application to the course convenor once the supplementary exam period has passed.

Course Learning Outcomes

- CLO1 : Solve problems in number theory involving divisibility, congruences, and finite fields.
- CLO2 : Apply finite field arithmetic in cryptography, coding, number theory, and theoretical computer science.
- CLO3 : Communicate mathematical ideas effectively and clearly in written form.

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Assessment Length

2 hours

Weekly Numbas Exercises

Assessment Overview

The nine sets of weekly Numbas exercises are designed to help you understand the course content and to get practice solving standard problems. You will have unlimited attempts at randomly-generated formative questions related to the content taught in lectures each week. The questions are automatically marked and provide immediate feedback that can be used for repeated attempts. You are allowed to work collaboratively on these questions. Each lesson gives a percentage score, and your best 6 of 9 scores are counted towards 10% of your final grade.

Course Learning Outcomes

- CLO1 : Solve problems in number theory involving divisibility, congruences, and finite fields.
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General Assessment Information

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 27 May - 2 June	Topic	Topic 1 - Integers and divisors
Week 2 : 3 June - 9 June	Topic	Topic 2 - Representation of numbers
Week 3 : 10 June - 16 June	Topic	Topic 3 - Modular arithmetic
Week 4 : 17 June - 23 June	Topic	Topic 4 - Solving linear equations
Week 5 : 24 June - 30 June	Topic	Topic 5 - Powers and primitive roots
Week 6 : 1 July - 7 July	Topic	Flexibility Week
Week 7 : 8 July - 14 July	Topic	Topic 6 - Applications
Week 8 : 15 July - 21 July	Topic	Topic 7 - Polynomials
Week 9 : 22 July - 28 July	Topic	Topic 8 - Finite fields
Week 10 : 29 July - 4 August	Topic	Topic 9 - Error-correcting codes

Attendance Requirements

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

General Schedule Information

The course content is broken into nine sections, roughly corresponding to the weeks of the term:

- Topic 1 - Integers and divisors
- Topic 2 - Representation of numbers
- Topic 3 - Modular arithmetic
- Topic 4 - Solving linear equations
- Topic 5 - Powers and primitive roots
- Topic 6 - Applications
- Topic 7 - Polynomials
- Topic 8 - Finite fields
- Topic 9 - Error-correcting codes

Course Resources

Prescribed Resources

The resources for this course are the lecture notes available on the course Moodle page.

Course Evaluation and Development

We value all students' feedback. Students will have an opportunity to contribute their feedback at the end of this course via the MyExperience survey.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Sean Gardiner		H13 Anita Lawrence Building 5108			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.

Academic Honesty and Plagarism

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,
- The ELISE training site, and
- The Use of AI for assessments 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

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.**