

2025-26
~~2024-25~~

MAT347Y1Y: Groups, Rings, and Fields,
University of Toronto

I Instructor and Teaching Assistants

Course Instructor

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First semester Instructor:

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TA(s):



II Course Overview

Course Description

Hours: 72L/24T

Groups, subgroups, quotient groups, Sylow theorems, Jordan-Hölder theorem, finitely generated abelian groups, solvable groups. Rings, ideals, Chinese remainder theorem; Euclidean domains and principal ideal domains: unique factorization. Noetherian rings, Hilbert basis theorem. Finitely generated modules. Field extensions, algebraic closure, straight-edge and compass constructions. Galois theory, including insolvability of the quintic.

Prerequisite: MAT257Y1/(85% in MAT247H1/MAT247H5)

Distribution Requirements: Science

Breadth Requirements: The Physical and Mathematical Universes (5)

Program Area Section: Mathematics

Course Objectives

- to obtain a working familiarity with the basic topics in modern algebra,
- to understand and be able to prove important parts of the theory,
- to acquire a large store of examples to exemplify and clarify the subject.

Textbooks/ Course Readings: Abstract Algebra, 3rd Edition

By Foote, Richard M., Dummit, David S

The textbook is not *required* for the course, but it is highly recommended. Older editions should be similar enough that they can be used.

How this course is organized:

Fall: SS 1073; Spring: BA1190 GB248

The course lectures will be delivered W10-12 and F11-12 in ~~GB244~~ in in-person mode. Students are expected to attend the classes.

There are two tutorials, both on Fridays, either 1-2 in ~~RW143~~ ^{WO30}, or 2-3 IN ~~SS1074~~ ^{FE213}. Each student must enrol in one or the other. Tutorials will begin on Friday, September 20, 19

Office hours will be announced in class. They may be held online over Zoom.

~~Please note that due to the ongoing COVID-19 pandemic, the course delivery method may change after term has started and this may alter the course organization. Students are expected to check the Quercus page for updates as the contents of this syllabus may change.~~

Technical Requirements

In order to participate in this course, students will be required to have:

- Reliable internet access. It is recommended that students have a high speed broadband connection (LAN, Cable, or DSL) with a minimum download speed of 5 Mbps.
- A computer satisfying the minimum technical requirements (<https://www.vicprovoststudents.utoronto.ca/covid-19/tech-requirements-online-learning/>)

Other recommended items include headphones, microphone, webcam, scanner, and a tablet or printer.

If you are facing financial hardship, you are encouraged to contact your college or divisional registrar (<https://future.utoronto.ca/current-students/registrars/>) to apply for an emergency bursary.

III Evaluation/ Grading Scheme

Assessment

We currently plan to hold the midterms and the final in person. They will be held with all the safety requirements of the university.

There will be a problem set nearly every week, submitted through Crowdmark. Sometimes not all of the problems will be graded.

There will be two midterm tests, conducted during class time. The first will be on Wednesday, November 13, 2024 in EX310. The other will be on Wednesday, February 5, 2025. These dates are subject to test room availability, and might have to be changed slightly if suitable rooms cannot be found.

Final Assessment

The final assessment will be a 3 hour exam held in person. It will be held during the spring exam period, and its date and location will be set later and given on the Quercus page.

GRADING SCHEME: The best 14 problem sets: 10%

Midterm tests, weighted equally: 40%

Exam	50%
Total	100%

IV Course Policies

Policy on Missed Assignments

As flexibility for missed or late course assignments have been built into the marking scheme, late and missed assignments will not be accepted for any reason.

Students who are absent from class for prolonged periods and who require consideration for missed academic work should contact the instructor and verify their absence(s) through either the Absence Declaration tool, Verification of Illness or Injury (VOI) form, College Registrar Letter, or Letter of Academic Accommodation from Accessibility Services, as appropriate to their situation.

<https://www.artsci.utoronto.ca/current/academics/student-absences>

The absence declaration can be used once per term. Outside of the one time absence declaration use, students must adhere to the alternate processes for absences listed above, as well as the missed work policy as set out in each course's syllabus.

If you miss a term test or the final assessment, then you must inform your course Instructor within 72 hours of the test. No exceptions. If your request is approved, you may receive an accommodation. The accommodation to be used will be decided by your instructor. Some examples of accommodations may include: an oral exam, written make-up test, or a re-weighting of your assessments. (*Academic Handbook Section 7 Missed Term Work or Tests*)

Re-marking Policy

A student who believes an individual item of work has been incorrectly or unfairly marked may ask the person who marked it for a re-evaluation. With evidence to back their appeal, students should make such requests as soon as reasonably possible after receiving the work back, but no later than 2 weeks after it was returned (*Academic Handbook Section 5.14 Requests to Re-mark Assignments & Term Tests*)

Plagiarism Detection Tool

A plagiarism detection tool may be used for detecting plagiarism in some of the written work submitted in this course. Normally, students will be required to submit their written work to the university's plagiarism detection tool for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their work to be included as source documents in the tool's reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the this tool's service are described on the Centre for Teaching Support and Innovation web site:

<https://teaching.utoronto.ca/resources/plagiarism-detection/>

e-mail Policy

Should you have a question that is not answered on the course site (please check there first!) please note that all communications with the Course Instructor or TA's must be sent from your official utoronto email address, with the course number included in the subject line. If these instructions are not followed, your email may not be responded to. Please write in a professional manner

(Academic Handbook Section 2.21 Online Communication Policy)

Land Acknowledgement

We wish to acknowledge this land on which the University of Toronto operates. For thousands of years it has been the traditional land of the Huron-Wendat, the Seneca, and the Mississaugas of the Credit. Today, this meeting place is still the home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work on this land.

V Institutional Policies and Support

Academic Integrity

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters

<https://governingcouncil.utoronto.ca/secretariat/policies/codebehaviour-academic-matters-july-1-2019>).

If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, please reach out to your Course Instructor. Note that you are expected to seek out additional information on academic integrity from me or from other institutional resources (for example, the University of Toronto website on Academic Integrity <http://academicintegrity.utoronto.ca/>).

(Academic Handbook Section 12 Academic Integrity)

Recording and Online Course Materials

Course videos and materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation and are protected by copyright. Do not download, copy, or share any course or student materials or videos without the explicit permission of the instructor.

For questions about recording and use of videos in which you appear please contact your instructor.

OR: Notice of Video Recording and Sharing (Download Permissible; Re-Use Prohibited)

This course, including your participation, will be recorded on video and will be available to students in the course for viewing remotely and after each session.

Course videos and materials belong to your instructor, the University, and/or other source depending on the specific facts of each situation and are protected by copyright. In this course, you are permitted to download session videos and materials for your own academic use, but you should not copy, share, or use them for any other purpose without the explicit permission of the instructor.

For questions about recording and use of videos in which you appear please contact your instructor.

Accessibility

The University provides academic accommodations for students with disabilities in accordance with the terms of the Ontario Human Rights Code. This occurs through a collaborative process that acknowledges a collective obligation to develop an accessible learning environment that both meets the needs of students and preserves the essential academic requirements of the University's courses and programs.

Students with diverse learning styles and needs are welcome in this course. If you have a disability that may require accommodations, please feel free to approach your Course Instructor and/or the Accessibility Services office as soon as possible. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

Link to Accessibility Services website: <https://studentlife.utoronto.ca/departments/accessibility-services/>
(*Academic Handbook Section 13 Accessibility/Disability Issues*)

Equity, Diversity and Inclusion

The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. U of T does not condone discrimination or harassment against any persons or communities.

Important Academic Dates & Deadlines

The academic dates include enrolment dates, drop deadlines, exam periods, petition deadlines and more.

<https://www.artsci.utoronto.ca/current/dates-deadlines/academic-dates>

Other Academic and Personal Supports

- Writing Centre <https://writing.utoronto.ca/writing-centres/arts-and-science/>
- U of T Libraries <https://onesearch.library.utoronto.ca/>
- Student Code of Conduct: <https://governingcouncil.utoronto.ca/secretariat/policies/code-studentconduct-december-13-2019>
- Feeling Distressed? <https://studentlife.utoronto.ca/task/support-when-you-feel-distressed/>
- Academic Success Centre <https://studentlife.utoronto.ca/departments/academic-success/>

- College/Faculty Registrars <https://future.utoronto.ca/current-students/registrars/>