University at Buffalo

MTH 419A Introduction to Abstract Algebra
Syllabus - Fall 2025

Lectures: Tue, Thu 9:30-10:50 AM, Math Building 122
Recitations:: Fri 1:00-1:50 PM, Math Building 250

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Course Resources:

- **Course Website:** `mth419.ubmath.info`. See this website for an up-to-date version of this syllabus, course lecture notes, homework assignments etc.

- **Lecture notes.** Skeletal lecture notes for each week will be posted on the course website. I will annotate these notes during lectures. Please print the notes and bring them to class to follow along.

- **Piazza.** We be using Piazza for course-related communications. The link to the Piazza webpage for this course is

  `piazza.com/buffalo/fall2025/mth419/home`

  If you have a question or comment related to the course please post it on Piazza. This will help other students who may deal the same issue. If you know the answer to a question somebody else posted on Piazza, please answer it. If you have a personal question (concerning your grade etc.), you can either send to me a private message on Piazza or contact me by e-mail.

- **Textbook.** Joseph A. Gallian, *Contemporary Abstract Algebra.*
  This book is currently in the 11th edition, but any older edition is just as fine - they all cover the same material and changes between various editions are mostly cosmetic.

- **UBLearns.** UBLearns will be used to collect homework assignments.

Homework. Homework problems will be assigned every week. You can collaborate on homework problems with other students in this course, but you must write solutions entirely on your own. Copying solutions from other students or from any other sources is a violation of the UB academic integrity policy and may result in academic sanctions (reduction of the course grade, course failure etc.). Any use of generative AI (Chat GPT etc.) for homework problems is prohibited.

Exams:

Midterm 1	Thursday, October 9	9:30-1:50 PM	Math Building 122
Midterm 2	Thursday, November 13	9:30-10:50 AM	Math Building 122
Final Exam	Wednesday, December 10	11:45 AM-2:45 PM	Math Building 122

Grading:

Homework	20%
Midterm 1	23%
Midterm 2	23%
Final Exam	34%

Learning outcomes. The goal of this course is to introduce basic notions and methods of abstract algebra. Course topics will include:

- Definition and elementary properties of groups.
- Cyclic groups, dihedral groups, symmetric groups.
- Homomorphisms and isomorphisms of groups.
- Subgroups
- Direct products of groups.
- Cosets, Lagrange theorem.
- Normal subgroups and quotient groups.
- Isomorphism theorems.
- Classification of finitely generated abelian groups.
- Rings.
- Ideals of rings and quotient rings.
- Ring homomorphisms.
- Integral domains.
- Polynomial rings.
- Fields.

Prerequisites. The main expectation is that students taking this course are familiar with reading and writing mathematical proofs to the extent that is covered in MTH 311. We will also use some notions related to sets and functions (also typically covered in MTH 311), as well as some elementary number theory (divisibility of integers, the greatest common divisor etc.). From time to time we will also use linear algebra (matrices, determinants, vector spaces etc.). These topics are cover in MTH 309.

Math Help Center. The Math Help Center is an additional place (beside lectures, recitations, and office hours) where you can seek help with questions related to this course. The Math Help Center is open Monday-Friday 10:00 AM-6:00 PM in room 110 of the Mathematics Building and it is staffed by math graduate students.

Incomplete grades. See the UB Catalog for the UB incomplete grades policy:
`catalogs.buffalo.edu/content.php?catoid=11&navoid=571#incomplete-grades`

Academic integrity. See the UB Catalog for the UB academic integrity policy:
`catalogs.buffalo.edu/content.php?catoid=11&navoid=571#academic-integrity`

Accessibility resources. If you need accommodations due to a physical or learning disability please contact the UB Accessibility Resources Office to make appropriate arrangements:
`www.buffalo.edu/studentlife/who-we-are/departments/accessibility.html`