

Abstract Algebra I

MATH 3510, Section 001 — Fall 2026

Lecture. Monday, Wednesday, Friday from 11:15am–12:05pm, MATT 109.

Instructor. Jing Zhang

Office: GAB 402

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Course Website. Announcements and materials will be posted on the Canvas page.

Office Hours. TBD, in GAB 402. Office hours will be announced during the first week of classes and posted on Canvas. No appointment is necessary to come to office hours.

Textbook. Dummit & Foote, *Abstract Algebra*, 3rd edition.

Topics. Sets and relations. The integers, congruences, and the Fundamental Theorem of Arithmetic. Groups and their quotient groups. Commutative rings, ideals, and quotient fields. The theory of polynomials: Euclidean algorithm and unique factorizations. The Fundamental Theorem of Algebra. Fields and field extensions.

Grades

Grading: Homework 20%, Midterm 1 20%, Midterm 2 20%, Final exam 40%. If your final exam score is higher than either of your midterm scores, your final exam score will replace either or both midterms. The final exam will be cumulative.

Letter grades will be determined by the weighted average of the above components: 90% or better will be an A; 80% to 89.99% will be a B; 70% to 79.99% will be a C; 60% to 69.99% will be a D; 59.99% and below will be an F.

Exams

We will have two in-class midterms and a final exam. No books, notes, or any electronic devices (including but not limited to calculators and phones) are allowed during the exams. This policy on electronic devices may not apply in certain situations determined by the ODA. No collaboration or consulting other sources is allowed during the exams. Exam dates are not negotiable, so do not make any plans conflicting with the exams.

- Midterm 1: Friday, October 9, in class.
- Midterm 2: Friday, November 6, in class.
- Final: Saturday, December 5, 10:30am–12:30pm, in the usual classroom.

Unauthorized Aids During Examinations and Assessments

Students may use only those materials and resources that are expressly authorized by the instructor for a particular examination or assessment. Touching, holding, or accessing any unauthorized aid

during the examination period constitutes a violation of the Student Code of Conduct, regardless of whether the aid is used.

Any item that may be considered an unauthorized aid must be kept out of view and in a closed container (e.g. zipped backpack, buttoned purse, etc.) during the entirety of the examination or assessment.

Unless specifically authorized in writing by the instructor, prohibited aids include, but are not limited to:

- Mobile phones and smartphones
- Smartwatches and fitness trackers with communication, recording, or internet capabilities
- Tablets, laptops, and other computing devices
- Earbuds, headphones, and other audio devices
- Smart glasses, cameras, recording devices, and wearable technology
- Artificial intelligence (AI) tools, chatbots, and other generative AI technologies
- Notes, textbooks, study guides, formula sheets, or reference materials
- Any other device, material, or resource not expressly permitted by the instructor

Students are responsible for clarifying any questions about permitted materials before the examination begins.

Homework

Homework consists of problem sets. Problem sets will be assigned weekly. The problem set of the week will be posted on the course website by Wednesday night and will be due the following Wednesday at 11:59pm. Your homework will be submitted online through Canvas. Please make sure to make good clean scans when submitting your materials. There are not very many assigned problems each week, so the write ups are expected to be legible, and all steps in solving a problem should be fully justified and explained clearly.

Late homework will not be accepted under any circumstances. This policy may not apply in certain cases determined by the ODA. In case of extended illness, please contact me as soon as possible. Note that two homework scores will be dropped before final grades are computed.

You are encouraged to discuss the problems with your classmates, but you must write your solutions on your own and acknowledge collaborators/cite references if any. A select number of problems will be graded. The lowest two scores will be dropped.

Tentative Course Outline

The following is intended to provide a rough outline of what will be covered when in class. Depending on how quickly students master certain concepts, more or less time may be devoted to particular topics than indicated here. Students should consult the schedule on Canvas that will be updated weekly during the course. Section numbers refer to Dummit & Foote.

Monday	Wednesday	Friday
8/17: Intro; sets, functions; the integers (§0.1, 0.2)	8/19: Equivalence relations; $\mathbb{Z}/n\mathbb{Z}$; Fund. Thm. of Arithmetic (§0.1, 0.3)	8/21: Groups: axioms and examples (§1.1)
8/24: Basic properties; orders of elements (§1.1)	8/26: Dihedral groups (§1.2)	8/28: Dihedral groups: relations and presentations (§1.2)
8/31: Symmetric groups; cycle decomposition (§1.3)	9/2: More on S_n : products, orders (§1.3)	9/4: Matrix groups; quaternion group (§1.4, 1.5)
9/7: No class (Labor Day)	9/9: Homomorphisms and isomorphisms (§1.6)	9/11: Homomorphisms and isomorphisms (§1.6)
9/14: Isomorphisms wrap-up; group actions (§1.6, 1.7)	9/16: Subgroups (§2.1)	9/18: Centralizers, normalizers, stabilizers (§2.2)
9/21: Cyclic groups (§2.3)	9/23: Cyclic groups; subgroups generated by subsets (§2.3, 2.4)	9/25: Cosets (§3.1)
9/28: Normal subgroups; quotient groups (§3.1)	9/30: Lagrange's theorem (§3.2)	10/2: First isomorphism theorem (§3.3)
10/5: The isomorphism theorems (§3.3)	10/7: Review	10/9: Midterm 1
10/12: Group actions: orbits (§4.1)	10/14: Orbit-stabilizer theorem (§4.1)	10/16: Cayley's theorem (§4.2)
10/19: Conjugation; the class equation (§4.3)	10/21: Applications of the class equation (§4.3)	10/23: Sylow theorems (§4.5)
10/26: Sylow theorems: applications (§4.5)	10/28: Direct products (§5.1)	10/30: Fund. Thm. of Finitely Generated Abelian Groups (§5.2)
11/2: Classifying abelian groups (§5.2)	11/4: Review	11/6: Midterm 2
11/9: Rings: definitions and examples (§7.1)	11/11: Integral domains; polynomial and matrix rings (§7.1, 7.2)	11/13: Ring homomorphisms and quotient rings (§7.3)
11/16: Ideals; prime and maximal ideals (§7.4)	11/18: Euclidean domains and PIDs (§8.1, 8.2)	11/20: UFDs; polynomial rings (§8.3, 9.2, 9.3)
11/23: No class (Thanksgiving)	11/25: No class (Thanksgiving)	11/27: No class (Thanksgiving)
11/30: Irreducibility criteria; field extensions (§9.4, 13.1, 13.2)	12/2: Field extensions; Fund. Thm. of Algebra; review (§13.1, 13.2)	12/4: Reading day (no class)
Final exam: Saturday, December 5, 10:30am–12:30pm, MATT 109.		

Announcements

I will frequently update the Canvas page with class information and new materials. To stay up to date, you should check the Canvas page regularly and/or select to receive email notifications about the Canvas announcements.

University Policies

Academic Integrity Policy. According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University.

ADA Policy. The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking reasonable accommodation must first register with the Office of Disability Access (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with a reasonable accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request reasonable accommodations at any time; however, ODA notices of reasonable accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of reasonable accommodation for every semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of reasonable accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student. For additional information, refer to the Office of Disability Access website (<http://www.unt.edu/oda>). You may also contact ODA by phone at (940) 565-4323.

Prohibition of Discrimination, Harassment, and Retaliation (Policy 16.004). The University of North Texas (UNT) prohibits discrimination and harassment because of race, color, national origin, religion, sex, sexual orientation, gender identity, gender expression, age, disability, genetic information, veteran status, or any other characteristic protected under applicable federal or state law in its application and admission processes; educational programs and activities; employment policies, procedures, and processes; and university facilities. The University takes active measures to prevent such conduct and investigates and takes remedial action when appropriate.

Emergency Notification & Procedures. UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Canvas for contingency plans for covering course materials.

Acceptable Student Behavior. Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunities to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Dean of Students to consider whether the student's conduct violated the Code of Student Conduct. The University's expectations for student conduct apply to all instructional forums, including University and electronic classroom, labs, discussion groups, field trips, etc. Visit UNT's Code of Student Conduct (<https://deanofstudents.unt.edu/conduct>) to learn more.

Access to Information – Eagle Connect. Students' access point for business and academic services at UNT is located at: my.unt.edu. All official communication from the University will be delivered to a student's Eagle Connect account. For more information, please visit the website that explains Eagle Connect and how to forward e-mail Eagle Connect (<https://it.unt.edu/eagleconnect>).

Student Evaluation Administration Dates. Student feedback is important and an essential part of participation in this course. The student evaluation of instruction is a requirement for all organized classes at UNT. The survey will be made available during weeks 13, 14 and 15 of the semester to provide students with an opportunity to evaluate how this course is taught. Students will receive an email from "UNT SPOT Course Evaluations via IASystem Notification" (no-reply@iasystem.org) with the survey link. Students should look for the email in their UNT email inbox. Simply click on the link and complete the survey. Once students complete the survey they will receive a confirmation email that the survey has been submitted. For additional information, please visit the SPOT website (<http://spot.unt.edu/>) or email spot@unt.edu.

Survivor Advocacy. UNT is committed to providing a safe learning environment free of all forms of sexual misconduct. Federal laws and UNT policies prohibit discrimination on the basis of sex as well as sexual misconduct. If you or someone you know is experiencing sexual harassment, relationship violence, stalking and/or sexual assault, there are campus resources available to provide support and assistance. The Survivor Advocates can be reached at SurvivorAdvocate@unt.edu or by calling the Dean of Students Office at 940-565-2648.

Class Recordings & Student Likenesses. In case synchronous (live) sessions in this course will be recorded for students enrolled in this class section to refer to throughout the semester: Class recordings are the intellectual property of the university or instructor and are reserved for use only by students in this class and only for educational purposes. Students may not post or otherwise share the recordings outside the class, or outside the Canvas Learning Management System, in any form. Failing to follow this restriction is a violation of the UNT Code of Student Conduct and could lead to disciplinary action.

Academic Support & Student Services

Mental Health. UNT provides mental health resources to students to help ensure there are numerous outlets to turn to that wholeheartedly care for and are there for students in need, regardless of the nature of an issue or its severity. Listed below are several resources on campus that can support your academic success and mental well-being:

- Student Health and Wellness Center (<https://studentaffairs.unt.edu/student-health-and-wellness-center>)
- Counseling and Testing Services (<https://studentaffairs.unt.edu/counseling-and-testing-services>)
- UNT Care Team (<https://studentaffairs.unt.edu/care>)
- Psychiatric Services (<https://studentaffairs.unt.edu/student-health-and-wellness-center/services/psychiatry>)
- Individual Counseling (<https://studentaffairs.unt.edu/counseling-and-testing-services/services/individual-counseling>)

Chosen Names. A chosen name is a name that a person goes by that may or may not match their

legal name. If you have a chosen name that is different from your legal name and would like that to be used in class, please let the instructor know. Resources for updating your chosen name at UNT: UNT Records, UNT ID Card, UNT Email Address, Legal Name. UNT euIDs cannot be changed at this time. The collaborating offices are working on a process to make this option accessible to UNT community members.

Pronouns. Pronouns (she/her, they/them, he/him, etc.) are a public way for people to address you, much like your name, and can be shared with a name when making an introduction, both virtually and in-person. Just as we ask and don't assume someone's name, we should also ask and not assume someone's pronouns. You can add your pronouns to your Canvas account so that they follow your name when posting to discussion boards, submitting assignments, etc. See <https://www.mypronouns.org> for additional information.

Additional Student Support Services.

- Registrar (<https://registrar.unt.edu/registration>)
- Math Lab (<https://learningcenter.unt.edu/math-lab>)
- Financial Aid (<https://financialaid.unt.edu>)
- Student Legal Services (<https://studentaffairs.unt.edu/student-legal-services>)
- Career Center (<https://careercenter.unt.edu>)
- Multicultural Center (<https://idea.unt.edu/multicultural-center>)
- Counseling and Testing Services (<https://studentaffairs.unt.edu/counseling-and-testing-services>)
- Pride Alliance (<https://idea.unt.edu/pridealliance>)
- UNT Food Pantry (<https://studentaffairs.unt.edu/food-pantry>)
- Academic Resource Center (<https://clear.unt.edu/canvas/student-resources>)
- Academic Success Center (<https://success.unt.edu/asc>)
- UNT Libraries (<https://library.unt.edu>)
- Writing Center (<https://writingcenter.unt.edu>)