Math 360 – Abstract Algebra I   **Fall 2021**
TTh 4:00 p.m.–5:15 p.m., W-1-34

Instructor: Steven Jackson
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Course Description

Math 360 is an introduction to the basic structures of modern algebra: groups, rings, and fields. Its continuation, Math 361, studies these structures in greater depth, culminating in an introduction to Galois theory.

Prerequisites

Admission to the course is contingent upon successful completion of Math 260 or an equivalent Linear Algebra course.

Textbook

There is one required text for the course: *A First Course in Abstract Algebra*, Seventh Edition, by John Fraleigh.

Grading

Course grades are based on weekly quizzes (20%), two in-class tests (20% each), and a cumulative final exam (40%).

Course wiki

This course makes use of a wiki, similar to Wikipedia, to disseminate homework assignments and to ease communication among students. The course wiki page can be found here:

> http://cartan.math.umb.edu/wiki/index.php/Math_360,_Fall_2021

Any registered student can edit this page or any of its sub-pages. You might find this useful for collaborative note-taking, or to ask one another questions about homework problems. The wiki supports LaTeX (see below), so it is relatively painless to write mathematical symbols and formulas.

To edit, you will first need to sign in. Your username is your UMB e-mail address. On first login, use the password reset link, and a random password will be e-mailed to you. After using this, you may change the password to something of your own choosing.

Reading and class preparation

There is a reading assignment associated with each class period. Although it is not generally possible to discuss every topic in class, students are responsible for the entire content of the reading assignment. *Test and exam questions may cover reading material not discussed explicitly in class.* Consequently it is very important to complete the reading assignments on time and to come to class prepared with questions.

Make-up tests

Tests may be rescheduled only in cases of serious illness, bereavement, or other circumstances of similar gravity. Whenever possible, arrangements for make-up tests must be made *in advance* of the regularly scheduled testing time.

Student conduct

Students are required to adhere to the University Policy on Academic Standards and Cheating, to the University Statement on Plagiarism and the Documentation of Written Work, and to the Code of Student Conduct. The section of the Code pertaining to academic honesty is available online at the following URL:

https://www.umb.edu/editor_uploads/images/life_on_campus/FINALUMBCode9-5-18-Appendix_B_V2.pdf

Violation of these policies will result in disciplinary action, as described in section B.II of the Code.

Travel during the final exam period

This course has a final exam during the period **December 16–22, 2021.** The exact time of the final is determined by the Registrar's Office, and will be posted on WISER around the middle of the semester. Students must not make travel arrangements which might conflict with their responsibility to take the final exam at the appointed time. In particular, **a purchased airline ticket does not constitute a valid excuse to miss the final, and no makeup exam will be granted under these circumstances.**

Conflict finals

University policy specifies that any student who has two final exams scheduled at the same time, or who has three or more final exams scheduled on the same day, is eligible to reschedule one of the exams. Under these circumstances, students who wish to reschedule their final exam in this class must notify the instructor in writing **no later than Monday, December 10, 2021.** You must include the course number, your name, and your student ID number in this notification. Department staff will then verify your eligibility to reschedule, and assign you to an alternate testing time if appropriate.

Accomodations for students with disabilities

Section 504 of the Americans with Disabilities Act of 1990 offers guidelines for curriculum modifications and adaptations for students with documented disabilities. If applicable, students may obtain adaptation recommendations from the Ross Center for Disability Services, CC-UL-211, (617-287-7430). The student must present these recommendations and discuss them with each professor within a reasonable period, preferably by the end of the Drop/Add period.

Schedule of topics

Week 1: Introduction. Sets and relations. (Textbook section 0.)

Week 2: More on sets and relations.

Week 3: Binary operations. Isomorphic binary structures. (Sections 2 and 3.)

Week 4: Groups and subgroups. (Sections 4 and 5.)

Week 5: Generating sets and cyclic groups. (Sections 6 and 7.)

Week 6: Groups of permutations. Orbits and cycles. (Section 8.)

Week 7: First midterm (Tuesday, October 20; covers assignments 1–5). Sign of a permuatation; the alternating group. (Section 9.)

Week 8: Cosets and Lagrange's theorem. Direct products and the Chinese Remainder Theorem. (Sections 10 and 11.)

Week 9: Groups of isometries. Homomorphisms. (Sections 12 and 13.)

Week 10: Quotient groups. Quotient group computations and simple groups. (Sections 14 and 15.)

Week 11: Second midterm (Tuesday, November 17; covers assignments 6–9). Group actions. (Section 16.)

Week 12: Rings and fields. (Section 18.)

Week 13: Integral domains. Theorems of Fermat and Euler. (Sections 19 and 20.)

Week 14: Euler's Theorem and RSA encryption.