

Modern Algebra

Course Syllabus

Fall 2025

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MACT 4134 is an introductory course to Abstract Algebra, mostly covering group theory, but also some ring and field theory. Much emphasis is put on writing rigorous mathematical proofs, understanding abstract concepts, and problem solving. The course covers the following topics: relations, functions, groups, subgroups, permutation groups, group isomorphism, Lagrange's Theorem, normal subgroups, group homomorphisms, direct products, Theorem of Finite Abelian Groups, rings, integral domains, fields, ideals, ring homomorphisms, and polynomial rings.

■ Main Textbook

Contemporary Abstract Algebra, Ninth Edition, 2017, by Joseph A. Gallian, Brooks/Cole, Cengage Learning, International Student Edition, ISBN: 978-1-305-65796-0.

■ Course Objectives

1. Read, understand, and construct rigorous mathematical proofs.
2. Become familiar with algebraic structures such as groups, rings, and fields.
3. Present mathematical work to your audience in a clear way.

■ Attendance

Attendance and participation in lectures are essential to the education process. Missing lectures is a waste of important educational opportunities. Students are expected to attend ALL lectures throughout the semester. The event of missing more than 6 lectures during the semester for any reason will drop your final letter grade or fail you the course.

■ Grading System

Tentative Letter Grade Conversion Table

F	D	D+	C-	C	C+	B-	B	B+	A-	A
0-51	52-54	55-59	60-64	65-69	70-74	75-79	80-84	85-88	89-93	94-100

Overall Grade Breakdown

Assignments	Midterm Exam	Project	Final Exam
25%	30%	15%	30%

Assignments: Your first contact regarding the grade of your assignment should be the teaching assistant. A portion of the assignment's grade is reserved for the clarity of mathematical writing. Practicing mathematics does not only involve producing correct answers and valid arguments, but also requires a clear and vivid presentation of your work. You are expected to write in complete English sentences using correct spelling and punctuation marks so that the reader of your work follows easily and enjoyably. I encourage you to discuss your ideas and collaborate with your peers and teaching assistants, however, you must use your own words and style of writing. Cheating will not be tolerated.

Project: Towards the end of the semester you will be asked to submit a paper on a topic to be announced. The paper should be written using the *Overleaf* website which uses LaTeX word processor, a widely used editor in academia.

■ Academic Integrity

All coursework is expected to be your own. Academic integrity is a commitment to five fundamental values: honesty, trust, fairness, respect and responsibility. Academic fraud and dishonesty includes cheating, plagiarism, fabrication, multiple submissions, obtaining unfair advantage, unauthorized access to academic or administrative systems, aiding and abetting, impersonation, threatening harm, and copyright infringement. For more elaboration about AUC academic integrity policy, please check [this link](#).

WARNING: AUC has zero-tolerance for violations of the academic integrity code.

■ General Notes

- Check your email and Blackboard Announcements regularly.
- Read carefully the lecture's material from the textbook.
- Attend ALL lectures.
- Full attendance is highly appreciated.
- Lectures will start punctually on time, so please do not be late.
- Copied assignments will initiate an academic integrity case.
- Feel free to interrupt to ask questions and present your ideas.
- **The ultimate goal of the course is to enrich your knowledge.**

■ Course Plan

The chapter numbers are as in the main textbook.

Chapter	Title	Chapter	Title
0	Preliminaries	8	External Direct Products
1	Introduction to Groups	10	Group Homomorphisms
2	Groups	11	Fundamental Theorem of Finite Abelian Groups
3	Finite Groups; Subgroups	12	Rings
4	Cyclic Groups	13	Integral Domains
5	Permutation Groups	14	Ideals
6	Isomorphisms	15	Ring Homomorphisms
7	Lagrange's Theorem	16	Polynomial Rings
9	Normal Subgroups	17	Factorization of Polynomials

All my best wishes!
Daoud Siniara