

MATHEMATICS 433, 434  
ABSTRACT ALGEBRA I, II

I. Introduction

A. Catalog Description

This course presents a rigorous treatment of modern algebra, hence the development and written presentation of proofs will be emphasized. Students will see modern applications of abstract algebra to problems in chemistry, art, and/or computer science, illustrating that this is a contemporary field in which important contributions are currently being made. Students will study topics including groups, rings, integral domains, field theory and homomorphisms. Applications such as coding theory, public-key cryptography, crystallographic groups and frieze groups may be covered. *Prerequisite: Math 232 or permission of the instructor.* Satisfies the proof-based requirement in major contracts.

B. Objectives

The primary objective of this course is for majors serious about careers in mathematics to develop the strong foundation in algebra necessary for graduate work in the discipline. The material covered in the second semester is important for prospective high school mathematics teachers. Thus, these students are encouraged to take Math 434. Students will also strengthen, and be assessed on, their communication, both written and oral, and problem solving skills.

C. Prerequisites

Math 232 or permission of the instructor.

D. Required Topics

1. Equivalence Relations
2. Groups and Subgroups
3. Homomorphisms
4. Quotient Groups
5. Rings and Ideals
6. Fields and Field Extensions
7. Applications

E. Bibliography

1. Herstein      Topics in Algebra
2. Fraleigh     A First Course in Abstract Algebra
3. Gallian      Contemporary Abstract Algebra
4. Rotman      A First Course in Abstract Algebra
5. Hungerford Abstract Algebra
6. Ehrlich      Fundamental Concepts of Abstract Algebra
7. Artin        Algebra