

MATHEMATICS 433, 434

ABSTRACT ALGEBRA I, II

I. Introduction

A. Catalog Description

This course presents a rigorous treatment of modern algebra. The writing of proofs is emphasized. Modern applications of abstract algebra to problems in chemistry, art, and computer science shows this is a contemporary field in which important contributions are currently being made. Topics include groups, rings, integral domains, field theory, and the study of homomorphisms. Applications such as coding theory, public-key cryptography, crystallographic groups, and frieze groups may be covered. These are proof-based courses. Satisfies the proof-based requirement in major contracts. *Prerequisite: MATH 290 or permission of the instructor.* MATH 433 offered Fall term only; MATH 434 offered Spring term only.

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