

## Mathematics 482 Abstract Algebra II

### 1. Catalog Description

#### **MATH 482 Abstract Algebra II**

**4 units**

Prerequisite: MATH 481.

Introduction to rings and fields. Reducible and irreducible polynomials, ideals, prime and maximal ideals, quotient rings, ring homomorphisms, the Isomorphism Theorems, integral domains, unique factorization domains, principal ideal domains, Euclidean domains, fields of fractions, field extensions and finite fields. 4 lectures.

### 2. Required Background or Experience

Math 481.

### 3. Learning Objectives

The student should:

- a. Know and be able to use the basic definitions and theorems of modern algebra.
- b. Recognize how these definitions and theorems relate to concepts from previous mathematics courses.
- c. Understand that groups, rings, and fields are specialized sets and that they codify the interesting characteristics of the familiar number systems, while homomorphisms on these objects are specialized functions which preserve algebraic structure.

### 4. Text and References

To be chosen by the instructor. Suggested texts include:

- Fraleigh, J., A First Course in Abstract Algebra
- Gallian, Joseph A., Contemporary Abstract Algebra
- Nicholson, W.K., Introduction to Abstract Algebra
- Rotman, Joseph J. A First Course in Abstract Algebra

### 5. Minimum Student Materials

Paper, pencils and notebook.

### 6. Minimum University Facilities

Classroom with ample chalkboard space for class use.

## 7. Content and Method

### Topics

- a. Introduction to rings
- b. Ideals and ring homomorphisms
- c. The isomorphism theorems
- d. Fields
- e. Integral domains, PIDs, UFDs
- f. Polynomial rings, irreducibility.

Additional topics include:

- a. The Chinese remainder theorem
- b. The Gaussian integers
- c. Introduction to fields and field extensions
- d. Geometric constructions
- e. Introduction to modules

## 8. Methods of Assessment

Comprehensive final exam, mid-term exams or quizzes, homework.