MATH 481 Abstract Algebra I

1. Catalog Description

MATH 481 Abstract Algebra I **4 units**

Prerequisite: MATH 306 or MATH 341.

Introduction to the study of groups. Topics include groups of permutations, cyclic groups, normal subgroups and quotient groups. Homomorphisms, Lagrange's Theorem, Cayley's Theorem, the Isomorphism Theorems and the Fundamental Theorem of Finite Abelian Groups. 4 lectures.

2. Required Background or Experience

Math 306 or Math 341.

3. Learning Objectives

The student should:

a. 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 groups
b. Subgroups and cyclic groups
c. Lagrange's theorem
d. Normal subgroups and quotient groups
e. Homomorphisms and the Isomorphism theorems
f. Group actions
g. The symmetric and alternating groups
h. Direct products
i. Fundamental theorem of finitely generated abelian groups

Additional topics include:
a. Sylow theorems
b. Semi-direct products
d. Other advanced group theory

8. Methods of Assessment

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