

Fall 2003

**NVCC COLLEGE-WIDE COURSE CONTENT SUMMARY
MTH 200 – ABSTRACT ALGEBRA (3 CR.)**

Catalog description

Prerequisite: MTH 174 or permission of instructor. Topics covered include groups, isomorphisms, fields, homomorphisms, rings, and integral domains. Designed to fulfill the abstract algebra requirement for the Virginia high school mathematics teaching endorsement. Lecture 3 hours per week. 3 credit hours.

Course Description:

Presents topics in abstract algebra to fulfill the abstract algebra requirement for the Virginia high school mathematics teaching endorsement. Studies groups, isomorphisms, fields, homomorphisms, rings, and integral domains. Lecture 3 hours per week.

General course purpose

This course is designed to fulfill Virginia's requirement for an abstract algebra course as part of the State's certification requirement for teaching mathematics at the secondary school level. The course should give the student understanding of the following:

- A. the required pieces of an abstract algebra system
- B. the importance and use of abstract algebraic structures in mathematics
- C. the importance and use of isomorphisms
- D. the origin and use of field properties in a high school algebra course

Entry level-competencies

MTH 174 - "Calculus with Analytic Geometry II" or consent of the division.

Course objectives

As a result of the learning experiences provided in this course, the student should be able to:

- A. define the basic terms of abstract algebra:
group, subgroup, isomorphism, normal subgroup, homomorphism, ring, integral domain, and field.
- B. determine whether a given structure is a group, a field, or a ring, as appropriate
- C. given two groups, determine if they are isomorphic, homomorphic, or if one is a subgroup of the other.
- D. illustrate group behaviors using finite groups, cyclic groups, and permutation groups
- E. illustrate ring, field, or integral domain behaviors using appropriate models

Major topics to be included

- A. groups
 - 1. definition
 - 2. subgroups

3. normal subgroup
4. types of groups
 - a. cyclic
 - b. finite
 - c. permutation
 - d. direct product
 - e. dihedral group

B. Isomorphism and homomorphism

1. definition
2. properties
3. Cayley's Theorem
4. factor groups

C. Rings, Fields, and Integral Domains

1. definitions
2. properties of each
3. examples of each