University of Arkansas – Fort Smith
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General Syllabus

MATH 4403 Abstract Algebra

Credit Hours: 3   Lecture Hours: 3   Laboratory Hours: 0

Prerequisite: MATH 3104 Foundations of Mathematics

Effective Catalog: 2020-2021

I.   **Course Information**

   A. Catalog Description
   A study of groups, rings, modules, and fields, subgroups, normal subgroups, quotient groups, abelian groups, groups of permutations, solvable and nilpotent groups, homomorphism, kernel, homomorphism groups, principal ideal domains, field extensions, and Galois theory.

II.   **Student Learning Outcomes**

   A. Subject Matter
   Upon completion of this course, the student will be able to:

   1. Perform computations and identify subgroups and normal subgroups in cyclic, dihedral, symmetric, and linear groups.
   2. Perform computations in quotient groups.
   3. Construct homomorphism groups.
   4. Perform computations and identify ideals in integral domains and polynomial rings.
   5. Identify rings that are unique factorization domains.
   6. Perform computations in finite groups.
   7. Construct simple algebraic extensions of the rational numbers.

   B. University Learning Outcomes
   This course enhances student abilities in the following areas:

   Analytical Skills
   Critical Thinking Skills: Students will use unifying principles to prove general results. Students will further develop their ability to create new proofs of familiar and unfamiliar ideas in more complex settings.

Communication Skills (written and oral)
Students will communicate proficiently. This will be accomplished by small group and individual presentations of problem-solving strategies as well as written reflections of various techniques for calculations.

III. Major Course Topics

A. Groups
   1. Finite and Infinite Examples
   2. Subgroups
   3. Quotient Groups
   4. Homomorphism Groups
B. Rings
   1. Ideals
   2. Integral Domains
   3. Polynomial Rings
   4. Unique Factorization
C. Fields
   1. Finite Fields
   2. Extension Fields
   3. Algebraic Extensions