Department: MATHEMATICAL SCIENCES Semester Hours: 3

Course Title and Number: MATH 420/520 - Algebra I

Course Description: Introduction to group theory. Properties of the integers, functions, and equivalence relations. A concrete approach to cyclic groups and permutation groups; isomorphism and the theorems of Lagrange and Cayley.
PRQ: Math 240

Course Objectives: To gain functional understanding of and skills for working with

- Mathematical reasoning in general and algebraic proofs in particular.
- Creation and communication of abstract mathematical ideas.
- The basic theory of the integers and modular arithmetic.
- Abstract properties and concrete applications of relations, functions, and permutations.
- Group theory as a unifying abstract context for systems of integers and permutations.

Syllabus:

- The integers: divisors; division algorithm and Euclidean algorithm; primes; congruences; integers modulo n; and induction.
- Functions, equivalence relations, and permutations.
- Groups: definitions and examples; subgroups; isomorphism; cyclic groups; permutation groups.

Current Textbook: J. Beachy and W. Blair, **Abstract Algebra**, 3rd ed., Waveland Press (2006), ISBN 1577664434.

Selective Bibliography:

G. Birkhoff and S. MacLane, **A Survey of Modern Algebra**, 1st ed., A K Peters/CRC Press (1998).
J. Fraleigh, **A First Course in Abstract Algebra**, 7th ed., Pearson (2002).
J. Gallian, **Contemporary Abstract Algebra**, 8th ed., Brooks/Cole (2013).
I. Herstein, **Abstract Algebra**, 3rd ed., Prentice-Hall (1996).
A. Hillman and G. Alexanderson, **Abstract Algebra: A First Undergraduate Course**, 5th ed., Waveland Press (1999).