Math 320: Introduction to Algebraic Structures

(Adopted - Spring 2016; Committee: Drs. J. Parish, M-S. Song, G.S. Staples)

Catalog Description: [PS, DNSM] Introduction to group theory. Groups, subgroups, cyclic groups, cosets and Lagrange's theorem, homomorphisms, factor groups. Prerequisite: 223 with grade of C or better.

Textbook: Contemporary Abstract Algebra 9th Edition, Joseph A. Gallian, 2013, CENGAGE Learning

Learning Objectives: By the end of this course, students will

- Understand the ways groups arise from and reflect such concepts such as symmetry and transformation.
- Recognize instances of (or roles played by) groups in other areas of mathematics, e.g., complex analysis, geometry, linear algebra, etc.
- Know the definitions of basic terms, such as: group, order of a group, order of an element, subgroup, cyclic group, factor group, and homomorphism.
- Be able to construct proofs involving groups and their properties.

Course Outline and Topics

Part 2 Groups
1 Introduction to Groups
2 Groups
3 Finite Groups; Subgroups
4 Cyclic Groups
5 Permutation Groups
6 Isomorphisms
7 Cosets and Lagrange's Theorem
8 External Direct Products
9 Normal Subgroups and Factor Groups
10 Group Homomorphisms
11 Fundamental Theorem of Finite Abelian Groups
Part 3 Rings
12 Introduction to Rings

Any instructor should cover all of the required sections.
It is recommended that one optional topic from Part 5 of the textbook also be included.