

Department of Mathematics and Statistics

Course: Math 345 Abstract Algebra I

Learning Objectives:

1. Master the standard computations of group and ring theory.
2. Learn the elementary theorems and proof techniques of group and ring theory.
3. Apply the theorems, proof techniques and standard computations of group and ring theory to solve problems.

Course Content:

1. Introduction to groups: definition, subgroups, the order of a group element, cyclic groups, permutation groups.
2. Group homomorphisms and isomorphisms, cosets, Lagrange's Theorem.
3. Normal subgroups and quotient groups.
4. Introduction to rings: definition, subrings, matrix rings.
5. Ring homomorphisms and isomorphisms.
6. Ideals, cosets, quotient rings.
7. Integral domains and fields.
8. The ring of polynomials over a field.

Recommended Textbooks:

1. *A First Course in Abstract Algebra*, John B. Fraleigh, Pearson.
2. *Abstract Algebra*, I. N. Herstein, Wiley.
3. *Abstract Algebra: An Introduction*, Thomas W. Hungerford, Brooks Cole.
4. *Contemporary Abstract Algebra*, Joseph A. Gallian, Houghton Mifflin.