



## Modern Algebra

| Course Code | Course Num. | Course Name    | Credit Hours | Lec | Lab | Tut | Prerequisites    |
|-------------|-------------|----------------|--------------|-----|-----|-----|------------------|
| MAT         | 321         | Modern Algebra | 4            | 3   | 0   | 2   | MAT222, MATH 223 |

### *Objectives:*

- To provide the student with a firm foundation in the abstract structure of algebra.
- To understand and practice the axiomatic methods of thinking.
- To be familiar with basics of group theory.
- To be familiar with rudiments of ring theory and integral domains.

### *Syllabus:*

- **Group theory:** Definition of a Group, Subgroups, Cyclic Groups, Permutation Groups, Homomorphisms, Cosets Lagrange's theorem, Normal Subgroups, and Factor Groups
- **Structures of groups:** Isomorphism Theorems, Conjugacy, Groups Acting on Sets, The Sylow Theorems. Finite Abelian Groups. Solvable Groups, Simple Groups.
- **Rings:** Basic Definitions. Ring Homomorphisms, Quotient Rings. Ideals. Fields. Euclidean Domains. Principal Ideal Domains. Unique Factorization Domains.
- **Polynomial Rings:** Definitions and Basic Properties. Polynomial Rings over Fields. Irreducibility criteria.

### *References:*

- **Abstract Algebra**, D. Dummit, R. Foote, John Wiley, 3<sup>rd</sup> edition (2004)
- **Contemporary Abstract Algebra**, J. Gallian, Houghton Mifflin Company; 5<sup>th</sup> Ed. (2001).
- **A first course in Abstract Algebra**, J. Fraleigh, Pearson Education, 1<sup>st</sup> Indian edition (2203).
- **Abstract Algebra: An Introduction**, T. Hungerford, Brooks Cole; 2<sup>nd</sup> ed. (1996).

