Reference: https://iitk.ac.in/math/index.php/2014-05-21-10-30-47/courses (MTH 204)

Syllabus: Pre-requisite: MTH102, None for M.Sc. 2yr

Group theory: Binary operation, and its properties, Definition of a group, Groups as symmetries, Examples: cyclic, dihedral, symmetric, matrix groups, Subgroups, Cosets, normal subgroups and quotient groups, Conjugacy classes, Lagrange's theorem, The isomorphism theorems, Direct and semi-direct products, Group automorphisms, Symmetric group and alternating group, Actions of groups on sets, Cayley's theorem, orbit and stabilizers, Class equations, p-groups, Sylow's theorem and applications: simplicity of groups, Classification of finite abelian groups. (Time permitting: Finitely-generated abelian groups, Free groups, Composition series, Jordan-Hölder theorem, Nilpotent and solvable groups). Ring Theory: Definition and examples, Ring homomorphism, Ideals and Quotient rings, Chinese Remainder Theorem, Integral Domain and quotient fields, Unique factorization domain, Principal Ideal domain, Euclidean domain, Gauss lemma, Polynomial Rings, Irreducibility of Polynomials, Ring of Gaussian Integers.

Reference materials:

1. J. Gallian: Contemporary Abstract Algebra, Narosa books Pvt. Ltd.
2. I. N. Herstein: Topics in Algebra, Wiley.
3. D. S. Dummit and R.M. Foote, Abstract Algebra, Wiley.
4. M. Artin, Algebra, PHI.
5. N. Jacobson, Basic Algebra I, Basic Algebra II, Dover Publications

Credits: 11