

A 16-Lecture Series of Algebra I

MATH5353 Algebra I with Dr. Malestein

Harley Caham Combest

August 25 - December 12

Preliminaries (Part 0)

- **Week 1 (Aug 25 - Aug 29):** Preliminaries: Basics, Integers, Modular Arithmetic (§0.1–0.3)

Group Theory (Part I)

- **Week 2 (Sep 01 - Sep 05):** Group Axioms, Examples, Dihedral and Symmetric Groups (§1.1–1.3)
- **Week 3 (Sep 08 - Sep 12):** Matrix Groups, Quaternion Group, Homomorphisms and Isomorphisms (§1.4–1.6)
- **Week 4 (Sep 15 - Sep 19):** Group Actions and Subgroups (§1.7–2.2)
- **Week 5 (Sep 22 - Sep 26):** Cyclic Groups, Subgroup Generators, Subgroup Lattices (§2.3–2.5)
- **Week 6 (Sep 29 - Oct 03):** Cosets, Lagrange’s Theorem, Isomorphism Theorems (§3.1–3.3)
- **Week 7 (Oct 06 - Oct 10):** Sylow Theorems and Applications (§3.4–4.6)
- **Week 8 (Oct 13 - Oct 17):** Direct/Semidirect Products, Abelian Groups, p-Groups (§5.1–6.2)

Ring Theory (Part II)

- **Week 9 (Oct 20 - Oct 24):** Ring Definitions, Polynomial and Matrix Rings (§7.1–7.2)
- **Week 10 (Oct 27 - Oct 31):** Ring Homomorphisms, Ideals, Quotient Rings (§7.3–7.4)
- **Week 11 (Nov 03 - Nov 07):** Fractions, CRT, Euclidean Domains (§7.5–8.1)
- **Week 12 (Nov 10 - Nov 14):** PIDs and UFDs (§8.2–8.3)
- **Week 13 (Nov 17 - Nov 21):** Polynomial Rings and Irreducibility (§9.1–9.4)

Module Theory (Part III - Core Only)

- **Week 14 (Nov 24 - Nov 28):** Modules, Quotients, Direct Sums (§10.1–10.3) (Thanksgiving – no class Wed–Fri)
- **Week 15 (Dec 01 - Dec 05):** Tensor Products, Structure Theorem for Modules (§10.4–10.5)
- **Week 16 (Dec 08 - Dec 12):** Canonical Forms: Rational Canonical Form (§12.2)