

Abstract Algebra
Math 521A
Michael E. O'Sullivan

Syllabus Fall 2009

Prerequisite

Math 245: Discrete Mathematics.

It is worthwhile to review the fundamentals of logic ("and", "or", "implies", "for all", "there exists", and negation). We will use a variety of proof methods in this course: direct proof, proof by contradiction, and mathematical induction. We use equivalence relations.

Text

Hungerford, Abstract Algebra: An Introduction 2nd ed.

Chapters covered

Chapter 1: The integers. §1 The division algorithm, §2 Divisibility, §3 Primes and unique factorization.

Chapter 2: Congruence in \mathbb{Z} and modular arithmetic. §1 Congruence and congruence classes, §2 Modular arithmetic, §3 The structure of \mathbb{Z}_p when p is prime.

Chapter 3: Rings. §1 Definition and examples of rings, §2 Basic properties of rings, §3 Isomorphisms and homomorphisms.

Chapter 4 Arithmetic in $F[x]$. §1 Polynomial Arithmetic and the division algorithm, §2 Divisibility in $F[x]$, Irreducibles and unique factorization, §4 Polynomial functions, roots and reducibility.

Chapter 5: Congruence in $F[x]$. §1 Congruence and congruence classes, §2 Congruence class arithmetic, §3 The structure of $F[x]/p(x)$ when $p(x)$ is irreducible.

Chapter 6: Ideals and quotient rings. §1 Ideals and congruence, §2 Quotient rings and homomorphisms.

Chapter 7: Groups. §1 Definition and examples, §2 Basic properties, §3 subgroups, §4 Isomorphisms and homomorphisms.

Grading

Written homework (12 assignments) 250 pts.

Exams (3 worth 150 each) 450 pts.

Final exam 300 pts.

Total 1000 pts.

The tests will include some proofs and some computations.

85% and above is an A

75% and above is a B

65% and above is a C