

# MATH 369

## Introduction to Abstract Algebra (4 units)

### Course Outline

Sections	Topics	# of weeks
1.1–1.4	<b>Integers:</b> Divisibility and prime numbers; modular arithmetic. Review as needed: students should be familiar with this from Math 267.	0.0
2.1–2.3	<b>Functions:</b> Brief review of equivalence relations; permutations and cycle notation. Focus on permutations; students should be familiar with most of Sections 2.1 and 2.2 from Math 267.	1.0
3.1–3.8	<b>Groups:</b> Definition of a group and examples; subgroups; cyclic groups; Lagrange’s theorem; isomorphisms and homomorphisms; cosets; normal subgroups and factor groups.	4.5
4.1–4.4	<b>Polynomials:</b> Fields; roots of polynomials; factors; division algorithm; extension fields; polynomials over $\mathbb{Q}$ , $\mathbb{R}$ and $\mathbb{C}$ . Emphasize examples of extension fields related to finite fields.	3.5
5.1–5.4	<b>Commutative Rings:</b> Definition of a ring and examples; integral domains; ideals and quotient rings; prime and maximal ideals; fields of quotients. Emphasize examples of quotient rings related to finite fields. Time permitting, discuss irreducible polynomials over $\mathbb{Z}_p$ and the construction of finite fields.	4.0
	<b>Tests</b>	1.0

Textbook: *Abstract Algebra*, 3rd edition, by J. Beachy and W. Blair.

Adopted: Fall 2007; Revised: Fall 2013.