

Math 3613: Introduction to Modern Algebra

Syllabus - Fall 2013

- Instructor: Dr. Birne Binengar
430 Mathematical Sciences
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- Lectures: 9:30 - 10:20, MSCS 445
- Office Hours: Mondays 3:30–4:30, Tuesdays 1:00–2:00, Fridays 8:00–9:00 in MS430
- Required Text: *Abstract Algebra: An Introduction*, Third Edition,
by Thomas W. Hungerford, Brooks/Cole, 2014
ISBN-13: 978-1-111-56962-4
- Prerequisites: Calculus II
- Course Objectives: The main purpose of this course is to teach students how to read, write, and understand mathematical proofs. In the course of doing so, students will study basic algebraic structures (congruence, rings, fields, etc.) as well as their various manifestations in integer and polynomial arithmetic.
- Homework: Homework problems will be assigned daily in class. All the homework assigned during a given week will be due at the beginning of the first class of the following week.
- Examinations: There will be two midterm examinations worth 100 pts each and one final examination worth 150 pts.
- Grades: Grades will be determined exclusively from homework, midterm, and final exam scores.

2 Midterm Examinations	200 possible pts.
Homework and Quizzes	50 possible pts.
Final Examination (Friday, Dec. 13, 8:00–9:50 am)	150 possible pts.
	<u>400 possible pts.</u>

Letter grades will be assigned as follows:

A:	360	-	400 pts.
B:	320	-	359 pts.
C:	280	-	319 pts.
D:	240	-	279 pts.
F:	0	-	239 pts.

MATH 3613 COURSE OUTLINE

I. Introduction to Proofs

- A. Elements of Mathematical Logic
- B. Methods of Proof
- C. Review of Set Theory
- D. Functions

II. Arithmetic in \mathbb{Z}

- A. The Division Algorithm
- B. Divisibility
- C. Prime Numbers

First Midterm

III. Modular Arithmetic

- A. Congruence and Congruence Classes
- B. Modular Arithmetic
- C. The Structure of \mathbb{Z}_p when p is Prime

IV. Rings

- A. Definition and Examples of Rings/ A_i
- B. Basic Properties of Rings
- C. Homomorphisms and Isomorphisms of Rings

Second Midterm

V. The Ring of Polynomials $F[x]$

- A. Polynomial Arithmetic and the Division Algorithm
- B. Divisibility in $F[x]$
- C. Irreducible Polynomials and Unique Factorization
- D. Polynomial Functions, Roots, and Reducibility

VI. Groups

- A. Definition and Examples of Groups
- B. Basic Properties of Groups
- C. Subgroups
- D. Group Homomorphisms