



COURSE INFORMATION

Instructor	Lauren Williams, PhD	Meeting Times	TTh 3:30 - 4:45
Email	lwilliams@mercyhurst.edu	Location	Hirt 209
Office Phone	(814) 824-2226	Website	https://integral-domain.org/lwilliams/math280/
Office	Old Main 404	Prerequisite(s)	Math 150 Linear Algebra Math 265 Trans. to Advanced Math or instructor approval
Office Hours	Mon 9:00 - 10:00 12:30 - 1:30 Tues 1:00 - 3:00 Wed 12:30 - 1:30 Thurs 8:00 - 9:00	Credits	3

COURSE DESCRIPTION

This is the first semester of a year long sequence on the study of algebraic structures. Course topics include the properties of numbers, equivalence relations, groups, rings, fields, direct products, homomorphisms and isomorphisms, and the natural development of various number systems.

OBJECTIVES

On successful completion of the course, students will be able to:

- provide the definitions of algebraic objects, and know some examples of each.
- develop abstract and critical reasoning by studying and writing mathematical proofs.
- understand the connection between modern algebra and other branches of mathematics.
- relate the material learned in this course to prerequisite courses.
- recognize algebraic structures and objects in everyday situations.
- learn about the historical development of modern algebra.

REQUIRED MATERIAL

We will be using **Contemporary Abstract Algebra**, 8th Edition, by Joseph A. Gallian. An older edition of the text would be fine. No other texts or materials are required. You will not be required to bring the text to class, so an electronic version is acceptable.

The book may be available as an inexpensive rental. If you plan to take Modern Algebra II (Math 281), it is highly recommended that you purchase the text, as you will need it for both semesters.

LECTURE NOTES

Because we'll see a few topics slightly out of order from the text, and because I wanted to include a few extra examples, I've typed my own lecture notes for the full semester (the most recent version is always available on the course website). There is more information in these notes than you'll be responsible for on exams, but I hope they are still useful and interesting. I would strongly recommend skimming over the relevant notes for each lecture before class starts, so you'll know what to pay attention to or ask about in class.

HOMEWORK

You will have several assignments due throughout the semester. You should expect to spend a fair amount of time on each assignment - don't wait until the night before it's due to get started! You are free to work together on your assignments, but everyone must submit their own work, in their own words. If you need an extension on an assignment, please let me know ahead of the due date so the same extension can be offered to the rest of the class.

Some assignments may include problems that you will not be required to turn in. Make sure to work on these problems anyway, as they could always appear on an exam.

EXAMS

We will have two midterm exams and a final exam. The final exam will be cumulative, while the midterm exams will focus on more recent material. Both exams will be based on homework problems, class examples, and any suggested problems that were not required as homework.

Exam Dates:

Midterm Exam: Tuesday, October 1

Midterm Exam: Tuesday, November 12

Final Exam: Thursday, December 12 (3:30-5:30)

GRADING

Your final grade in the course will be calculated as follows:

40%	Midterm Exam Average
35%	Homework Average
25%	Final Exam

and converted to a letter grade using the scale below:

A	B+	B	C+	C	D+	D
90	87	80	77	70	67	60

PROGRAM OUTCOMES

This course will be used to assess our department's goal of meeting the following Mathematics Program Objective:

#4: Prove and disprove mathematical statements using an appropriate technique to create a formal, coherent, and well structured argument supported by logic and the correct application of known theorems and definitions.

This assessment does not impact your grade, nor is it based on your grade. A specialized rubric, available on request, will be used to score selected homework problems *independent* of the methods used to grade your work for course purposes.

LEARNING DIFFERENCES

Mercyhurst University is committed to making reasonable accommodations to assist individuals with disabilities in reaching their academic potential. Students with disabilities requiring accommodations should consult with the Learning Differences Office to discuss eligibility for services or submit the online accommodation request to the Director of Equal Opportunity Programs (DEOP) at ada@mercyhurst.edu.

For students requiring accommodations for learning differences, it is the policy of Mercyhurst University that it is the student's responsibility to provide documentation of his/her disability to the DEOP.

Students are advised to request accommodations at the time of acceptance or prior to the start of the semester. Students may request accommodations at any time throughout the program, however accommodations are not retroactive.

SEMESTER SCHEDULE

Aug	22	Class Intro, Review
	27	Review: Sets, Properties of Numbers
	29	Review: Functions, Equivalence Relations
Sep	3	Review: Equivalence Relations, Modular Arithmetic
	5	Review: Linear Algebra
	10	Groups: Preliminary Examples, Definitions
	12	Properties of Groups
	17	Properties of Groups, Cayley Tables
	19	Order
	24	Subgroups
	26	Centers and Centralizers
Oct	1	Midterm I
	4	Cyclic Groups, Generators
	8	Group Homomorphisms
	10	<i>Mid Semester Break - No Class</i>
	15	Group Isomorphisms
	17	Properties of Isomorphic Groups
	22	<i>Advising Day - No Class</i>
	24	Permutations
	29	The Symmetric Group
	31	Cosets
Nov	5	Lagrange's Theorem
	7	External Direct Products
	12	Midterm II
	14	Fund Thm of Finite Abelian Groups
	19	Normal Subgroups and Factor Groups
	21	Isometries
Dec	26	Finite Symmetry Groups
	28	<i>Thanksgiving Break - No Class</i>
	3	Infinite Symmetry Groups
	5	Extra Symmetry Topics and Review
Dec	9	<i>Reading Day</i>
	12	Final Exam 3:30 - 5:30

Other Important Dates:

Aug	26	Last day to add/drop
Sep	8	Jacobson's Birthday (1910)
	10	Palindrome Day
	19	Mass of the Holy Spirit
Oct	24	Cardano's Birthday (1501)
	25	Galois' Birthday (1811)
Nov	8	Last day to pass/fail
	15	Last day to withdraw
Dec	23	Fibonacci Day
	10	Jacobi's Birthday (1804)
	12	Sylow's Birthday (1832)
	17	Lie's Birthday (1842)

