

MATH 3113

Abstract Algebra I (Fall 2022)

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MWF 9:40 - 10:30 AM
MEEG 216

Overview

This is an introduction to abstract algebra. In algebra, we focus on mathematical structure. When are structures the same? Different? And how? We also focus on mathematical symmetry. How are objects internally built or organized?

Learning goals

Recognize algebraic structures.

Understand symmetry.

Manipulate algebraic axioms.

Develop the theory of equations.

Analyze mathematical proofs.

Materials



Textbook

Abstract Algebra (3rd/4th ed.)
by Beachy and Blair
(Rent/buy: \$37/\$63*)



Course materials

Study guide. Access on:
johnabeachy.com/abstractalgebra
(Free)



Discussions, meetings, etc.

Materials posted to
learn.uark.edu
(Free)

*Used costs. If costs cause hardship or would limit your course access, email me for support.

Course breakdown

Students process on their own time. They engage problem solving alone and with peers. We assessment both skills and theoretical development. A final project completes the learning arc. (*Details on pg. 5-6.*)



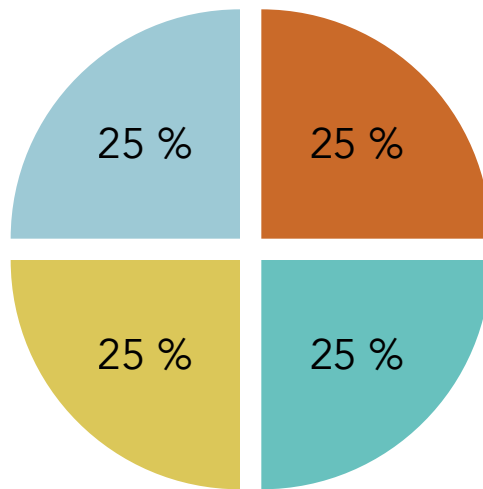
Process

Assigned readings.
Record responses.
Supplementary videos.
Per week ≈ 4+ hrs.

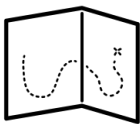


Engage

Prepare examples.
Solve exercises.
Post questions.
Per week ≈ 6+ hrs.



Four components evenly
counting towards final marks



Project

Prepare a report.
Present your findings.
Use the text or other material.
Milestones throughout course.



Assess

Mastery assessments ("exams").
Test skills and theory.
Corrections allowed.
Twice during semester.

Late work

Late work is accepted (details below). If you need time for an assignment, tell me. Give a reason, if it provides context. If you face debilitating circumstances or have overwhelming concerns of wellness, contact: me, a trusted mentor, U of A Cares (uofacares.uark.edu), or the Wellness Center (health.uark.edu).

Resources



Email

Your questions are important. Email me or post to Blackboard. (I may ask you to do this anyways.) Responses may take 24 hours, but send a reminder if I do not reply.

Office hours

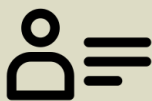
Ask anything you like in office hour! Being a student today is extra stressful — if you want to discuss your life or future outlook, I will lend an empathetic ear. During the semester, there will be three (3) office hours.



Appointments

Office hours will not always fit your schedule. Email me to set appointments. In your initial message, please explain (i) what you want to talk about, (ii) *your* availability and (iii) if meeting in person is important (Zoom is possible).

Class formation



Names and pronouns

You deserve to be called how you want. Let me know your preferred name and pronouns any time. When meeting one another, re-introduce yourself *frequently*. Everyone's names, pronouns, etc. should be known and properly used.

Academic integrity

I trust my students to follow (i) the University of Arkansas Academic Integrity Policy and (ii) my own explicit assignment instructions. When you have questions about a boundary or rule, ask me rather than assuming you know the answer.



Access

I want you to pass this class, with success. If you find resources not being provided, tell me and I will work with you to fix the issue. For some students, the Center for Educational Access (cea.uark.edu) can coordinate student accommodation requests. Please request your accommodation letter early semester and meet me to discuss it.

Diversity

I welcome all forms of participation. I pledge attention for your identity and experience, regardless of your age, background, beliefs, ethnicity, gender identity and expression, national origin, racial identity, religious beliefs, sexual orientation, and any other visible or non-visible categories. Please acknowledge the same for your peers.



Tips for success



Read!

Before class.



Post!

To Blackboard.



Collaborate!

In class. With peers.



Conference!

With me.



Practice!

Repetition is key.



Budget!

Give yourself time.

More tips: We all get stuck and frustrated.

- Take a break.
- Explain to someone why you are stuck.
- Check hypotheses or assumptions.
- Work out a single example.
- Keep going!

Schedule overview

Module 1 2 weeks	August 22 - September 2. Review of the integers. Introduction to congruences.	Reading: Ch. 1. Project: Initial step due.	
Module 2 2 weeks	September 5 - September 16. Review of functions. Introduction to permutations.	Reading: Ch. 2. Project: Conversation due.	
Module 3 3 weeks	September 19 - October 7. Introduction to groups. Definitions and main examples.	Reading: Ch. 3.1-3.3. Project: Proposal due.	
Module 4 4 weeks	October 10 - November 4 Advanced group theory. Isomorphisms and factor groups.	Reading: Ch. 3.4-3.8. Project: Outline due.	
Module 5 3 weeks	November 7 - December 2 Introduction to polynomials. Algebra of factoring and roots.	Reading: Ch 4. Project: Finish it!	
Final 1 week	December 5 - December 9 Project presentations	Project: Paper due Dec 14 by 12:15 PM.	

Process

Processing is a major way to participate in MATH 3113. Frequent readings help you process material. You will record answers to short questions and regularly share them in class.

Reading assignments and guides (one per reading)

Read the text. Focus on highlighted passages.

Need extra help? Watch videos I suggest, or find your own.

Bring finished reading guides to class for credit!

Class contributions (once per week per person, on average)

In class, we summarize readings to start the discussion.

You will share ideas, questions and examples.*

I will not cold-call. You have control over when to share.

*Online participation is also possible through Blackboard.

Prepare for
class.

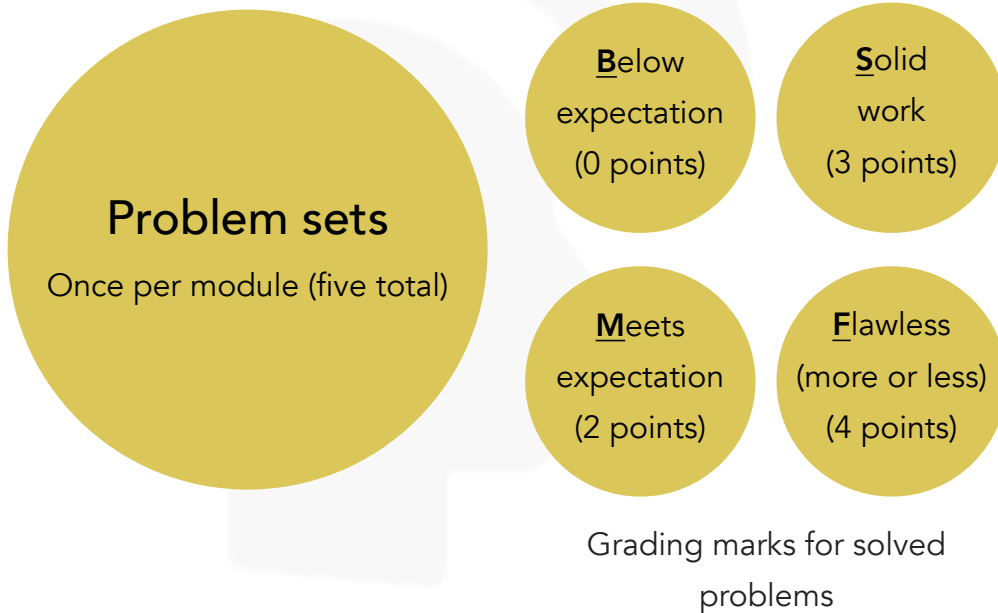
Credit for
effort.

Late work

Late reading guides accepted
once per four readings.

Engage

You engage material by solving exercises, including proof writing. We share examples and techniques in class. Out of class, you write up solutions to selected exercises. Many are mandatory. You can turn in *as much as you like*.



Late work

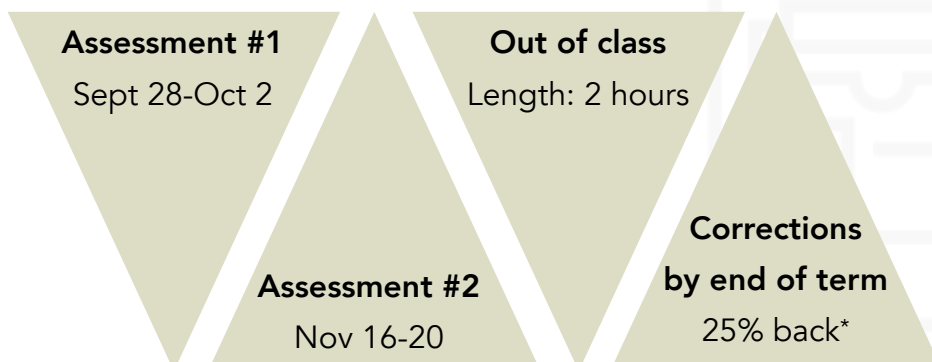
Late problem sets are accepted
until corrections are returned
and solutions posted.

Collaboration

Using peers and extra resources
is encouraged. Sources must be
acknowledged. Anything you
turn in must reflect your
personal understanding.

Assess

Mastery assessments are your chances to show overall knowledge, then make corrections and grow.



Extra resources?

You may consult class materials,
the text and its study guides.
You may *not* search the internet
or consult other persons during
the assessment.

*Original 80, corrected 100
becomes $80 + 20/4 = 85$.

Project

The project allows you to learn beyond the course. Each module includes a step in the process. Your final work will be yours alone, occurring in the final weeks of the course.

1 Think it out!

Browse the text and search the internet. Post a list of topics.

2 Talk it up!

Discuss with me and others.
Expand on your interests.

3 Choose your task!

Write a proposal for your project's main goal.

4 Plan your path!

Write an outline of your project, including bibliographic info.

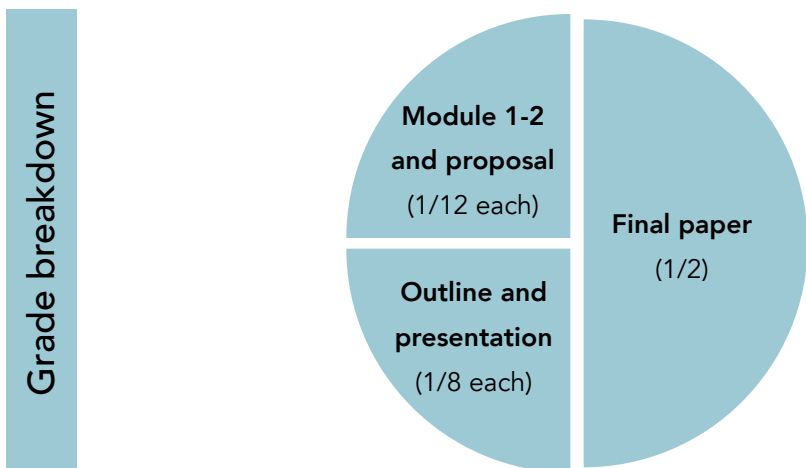
5 Finish it up!

Write your paper and prepare your presentation.

Grading

You earn credit for every portion of the project. Modules 1 and 2 are graded on effort (2 points each). The rubric below is for the remaining portions. Each bullet point is 1 point. (24 total points).

Rubrics	<i>Proposal (2 paragraphs)</i>	<ul style="list-style-type: none"> Is a precise, motivated investigation proposed? Is there a clear connection to abstract algebra? 	<i>Paper (8+ pages, double-spaced, 1" margins, 12 pt. font)</i>
	<i>Outline (1-2 pages)</i>	<ul style="list-style-type: none"> Is there a clear plan for the project? Is there room for background and content? Is there a sufficient bibliography? 	
	<i>Presentation (5-ish minutes, short!)</i>	<ul style="list-style-type: none"> Did the presenter motivate their investigation? Did the presenter explain their main outcome? Are the slides well-constructed? 	



Late work?
Late work for Modules 1-4 is accepted.