MAT 150A: Modern Algebra
Syllabus

Dr. Melissa Zhang

Fall Quarter 2023

1 Course information

1.1 Meetings

Section	CRN	Lecture	Discussion	Final Exam
A01	38530	MWF 4:10-5:00 PM, HOAGLD 168	T 6:10-7:00 PM, GROVE 1283	R Dec.14 at 6:00pm
A02	38531	MWF 4:10-5:00 PM, HOAGLD 168	T 7:10-8:00 PM, GROVE 1283	R Dec.14 at 6:00pm
C01	38534	MWF 10:00-10:50 PM, HOAGLD 168	R 5:10-6:00 PM, GROVE 1283	M Dec.11 at 3:30pm
C02	38535	MWF 10:00-10:50 PM, HOAGLD 168	R 6:10-7:00 PM, GROVE 1283	M Dec.11 at 3:30pm

Short Description Basic concepts of groups, symmetries of the plane. Emphasis on the techniques used in the proof of the ideas (Lemmas, Theorems, etc.) developing these concepts. Precise thinking, proof writing, and the ability to deal with abstraction.

Prerequisites MAT 067 or (MAT 022A or MAT 027A or BIS 027A, MAT 108)

Text *Algebra* by Michael Artin; Addison Wesley; 2nd edition (August 13, 2010); ISBN-10: 0132413779; Search by ISBN on Amazon: 978-0132413770

- An electronic version of this textbook is available through the Equitable Access Bookshelf, which you can access through our Canvas page.

Instructor Dr. Melissa Zhang (mlzhang@ucdavis.edu), MSB 2145

- I generally handle my emails once daily, on business days. If you email me, you can expect a response from me within 1-2 business days.
- If you want to speak privately during office hours (e.g. about your grades), let me know. If you want to meet with me individually outside of office hours, please make an appointment by email at least 24 hours in advance.

Instructor office hours: MSB 2145, Fridays 11–12 and 3–4

Teaching assistants (TA):

- Sections A01–A02: Ian Sullivan (iasullivan@ucdavis.edu)
- Sections C01–C02: Trevor Oliveira-Smith (tdoliveirasmith@ucdavis.edu)

TA office hours: TBD

Website: All materials for this course will be available at https://www.melissa-zhang.com/Teaching/SQ2023/MAT180.html. This includes the syllabus, class calendar, lecture notes, homework PDFs and TeX files, and any other additional materials.

In addition to the class website, we will also use

- Canvas for (1) recording grades, (2) Equitable Access Bookshelf, and (3) important announcements
- Gradescope for (1) submitting and grading homeworks, and (2) grading exams

Course Drop Date: October 24, 2023 (20 Day Drop) See the class calendar for additional important dates.

2 Course description

Course Description This course is the first of a three-term series covering the basics of modern algebra. The main abstract concepts we will study are groups, whose structures are also present in rings and fields, which will be focused on in later quarters. In particular, we will explore concepts including the following:

- how groups keep track of actions on and symmetries of sets, spaces, and other objects
- functions between groups, subgroups, quotient groups, and other ways of obtaining new groups from known groups
- how linear algebra gives us a concrete way to understand abstract groups
- how groups are described and classified

Learning goals: In this course, students will advance various conceptual and technical skills related to reading, writing, discussing, and discovering advanced mathematics. Knowledge and skill-based goals of this course include the following:

- Students will develop intuition for algebraic objects, relationships between them, and their important properties.
- Students will refine their ability to read, comprehend, and discuss abstract mathematics, and to present clear, rigorous proofs and calculations.
- Students will learn to translate fluently between concrete visual problems and abstract algebraic structures.
- Students will be able to constuct algebraic structures, analyze them, and apply abstract reasoning to construct robust proofs.
- Students will develop a familiarity with typesetting mathematics in LaTeX.

Disclaimer: The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary. It is the responsibility of the student to seek clarification of the grading policy and/or course requirements and procedures from the instructor.

3 Assignments and grading

Your numeric grade will be calculated using the following weights. Each assignment type will be discussed further below.

Participation	5%
Homework	30 %
2 Midterm Exams	15 % x 2 = 30%
Final Exam	35%
Total	100%

Participation At the beginning of each class, there will be a short review problem to work on. You will work on this problem with your peers sitting around you, and then submit your work at the end of class.

- Grading of these assignments will begin at Week 4 (starting Lecture 9, October 16, 2023), which is after the last day to add this course.
- To achieve full credit for the Participation grade, you must **submit at least 15 slips.** This means you are encouraged to attend at least 15 out of the 20 non-exam lecture days on and after October 16.
- There is no way to make up these collaborative assignments; this is why you have 20-15 = 5 leeway days, in case something comes up.
- **If there are personal circumstances preventing you from completing these assignments or attending lectures, contact me as soon as possible** and we can discuss a modified plan.

Homework: Homeworks will be due weekly on **Tuesday nights at 11:59 pm, on Gradescope**. Your solutions **must** be submitted as LaTeX'ed PDFs; images may be hand-drawn and inserted as figures.

- Dropped grades: Your single lowest HW grade will be dropped at the end of the quarter.
- Homeworks may be submitted up to 48 hours late on Gradescope. Late homeworks will incur a 20%-per-day penalty (< 1 day late = 80% of points, < 2 days late = 60% of points). After these 48 hours, homeworks will no longer be accepted. I will post the solutions the following day.
- The above policies are in place to help you handle the fluctuations of your personal responsibilities throughout the quarter. No other extensions/drops will be granted, except in documented extenuating circumstances. **All assignments must be submitted by the last day of class, December 8, 2023.**

Midterm Exams There will be two in-class pen-and-paper midterm exams, scheduled for the following dates:

- Exam 1: Wednesday, October 25, 2023
- Exam 2: Wednesday, November 15, 2023

These dates are very unlikely to change, so please plan accordingly. There will be **no makeup exams**. If you miss any of these exams for any reason, your grade will be replaced by your final exam grade.

Final Exam The final exam for this course is scheduled by the University and cannot be changed:

- Sections A01, A02: Thursday, December 14, 2023 at 6:00 pm
- Sections C01, C02: Monday, December 11, 2023 at 3:30 pm.

The final exam will be a 2-hour paper-and-pencil exam similar in structure to the midterm exams.

- To see your personal final exam schedule, go to

  https://registrar.ucdavis.edu/registration/register-for-classes/finals

  In particular, the University policy states:

  > *Students wishing to adjust their final exam schedule because of multiple exams on the same day must make arrangements with the instructors of the courses. Students are responsible for ensuring they do not have conflicting exams. There is no regulation mandating a change.*

Letter grades: At the end of the quarter, letter grades will be assigned using the following scale:

< 60	$60-62$	$63-66$	$67-68$	$69-71$	$72-76$	$77-78$	$79-81$	$82-86$	$87-89$	$89-91$	≥ 92
F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A

- The assigned letter grade will be a lower bound for your final recorded grade. For example, any numerical grade x within the range $82 \leq x < 87$ translates to a grade of at least B. You should count on receiving the letter grade indicated by the chart.
- Note that “rounding up" has already been built into the grading scale. Requests to further round up at the end of the quarter will be denied.

4 Course policies and procedures

Diversity and inclusion statement: In this classroom, you will be treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class. (Source: modified from https://docs.asee.org/public/LGBTQ/Diversity_Statement.pdf)

Classroom expectations: We will discuss mathematics together on a daily basis. These discussions are important because they provide for a richer classroom discussion, and they ensure that we all encounter different ways – correct and/or incorrect – of thinking about the material. It will be important for you to listen attentively to your peers' thinking, even if you think you already have a full solution to the discussion problem. I expect you to respond respectfully and carefully to your peers' comments. When you are working in groups, I expect you to help your group members to all work at the same pace; it will be important for you to keep your peers informed about the choices you are making, and for you to check in with them to make sure they follow your thinking and are ready to move on.

Electronics policy: Cell phones may not be used in class. Laptops, tablets, etc. may be used only for note-taking or other class-related activities, during class. I understand that there may be times when you need to be connected (childcare issues, family emergencies, etc.). If such a situation arises, please step outside and address these as needed. If you repeatedly violate this policy, you will be asked to leave the room immediately.

Academic honesty: See the UC Davis Code of Academic Conduct at

https://ossja.ucdavis.edu/code-academic-conduct

You are encouraged to discuss homework with others, but any solution that you hand in must be thought through and worked through on your own and written down in your own words.

Accessibility For accommodations for disabilities, go to

https://sdc.ucdavis.edu

and begin the process as soon as possible. I will need to approve a letter from the Student Disability Center before making any accommodating changes to the policies stated on this syllabus for you. It is the student's responsibility to make sure all accommodations are set up through the SDC ahead of exams or class meetings where accommodations are needed.