

Syllabus: Introduction to Abstract Mathematics

MAT 108

Dr. Melissa Zhang

Winter Quarter 2023

1 Course meeting information

Lectures	VEIMYR 116	MWF 11:00 am – 11:50 am
Section D01 45823 Discussion	WELLMN 207	T 5:10 pm – 6:00 pm
Section D02 45824 Discussion	WELLMN 201	T 6:10 pm – 7:00 pm

Course instructor: Dr. Melissa Zhang (mlzhang@ucdavis.edu), MSB 2145

- You may call me “Dr. Zhang”. To pronounce my last name, choose your own comfort level:
 - Level 1 *Doctor Zang* (rhymes with “hang”)
 - Level 2 *Doctor Djong* (rhymes with “gong”)
 - Level 3 [https://en.wikipedia.org/wiki/Zhang_\(surname\)](https://en.wikipedia.org/wiki/Zhang_(surname))
- I generally handle my emails once daily, on business days. As such, if you email me, you can expect a response from me within 1-2 business days.

Instructor office hours: MSB 2145, Mondays 1-2 pm and Thursdays 1-3 pm

- 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. If you receive a grade of D or F on any assignment, schedule a meeting with me as soon as possible.

Teaching assistant (TA): Hans Oberschelp (hoberschelp@math.ucdavis.edu), MSB 2202

TA office hours: MSB 2202, Mondays 2-4 pm and Thursdays 10-11 am

Website:

- <https://www.melissa-zhang.com/Teaching/WQ2023/MAT108.html> for all course materials
- [Canvas](#) for submitting homeworks, receiving feedback on assignments, recording grades

Textbook: *The Art of Proof* by Matthias Beck and Ross Geoghegan, available digitally here:

<https://matthbeck.github.io/papers/aop.noprint.pdf>

- Students do not need to purchase a physical copy.

Course Drop Date: February 06, 2023 (20 Day Drop)

2 Course description

The italicized text in the following paragraphs comes directly from the Department Syllabus for this course, available at

https://www.math.ucdavis.edu/courses/syllabus_detail?cm_id=99

Prerequisite: *Completion of course MAT 21B (or equivalent).*

Learning goals: *The primary goal of 108 is to teach students the fundamentals of mathematical thinking and clear writing of mathematical arguments. This is the a beginners exposure to the notion of proof, to the language used by mathematicians (e.g., implications, quantifiers, notion of contradiction, induction). Most of the explanations and practice will use examples from basic set theory, basic combinatorics, and algebra.*

Mastery of this course enhances the ability to write clear well-organized scientific arguments. Mastery of this course also supports the development of clear analytical thinking.

In particular, we will focus on the following:

- how to read a proof: how to verify a statement is proven
- how to write a proof, including how to typeset mathematics
- common mathematical structures seen in proofs
- an introductory survey of common mathematical objects

Tentative course outline: Below is a rough outline of the topics covered in the course. The book chapters come from the class textbook. The topics listed are those we will focus most heavily on within the listed chapters.

Week	Book Chapters	Topics
1	1, 2	proofs, induction
2	4	recursion
3	3, 5	logic, set theory
4	6	equivalence relations, partitions
5	8, 9	functions, injections and surjections
6	10, 11, 12	distance, limits, rational and irrational numbers
7	13, F	cardinality, ordinals
8	B, C	cryptography, complex numbers
9	D	groups, rings, fields
10	D	groups, homomorphisms, graphs

The **class calendar** is available at the course website and will be continually updated throughout the quarter to reflect changes in the scheduled lessons.

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	10%
Homework	40%
Midterm exams	$15\% \times 2 = 30\%$
Final Exam	20%
Total	100%

Participation: While I will not be taking attendance every class meeting, your weekly participation grade will depend on how much you interact with the course. **Success in this course requires consistent effort and attention**, so if you are repeatedly absent or otherwise not paying attention in class, you will lose participation points. Here's a set of scenarios to give you a sense of how your participation will be judged each week:

- (10/10) You show up to class every day and actively participate in the groupwork at the discussion section.
- (8/10) You show up to all classes but are not actively participating in learning activities.
- (2/10) You fail to attend classes but show up to an office hour to check in with either the instructor or the TA.
- (0/10) You don't show up to class (without emailing me with a documented reason / setting up an agreement with me beforehand) the whole week, and also don't show up to office hours.

Note that "active participation" is a very general term, and not meant to be particularly stringent. For example, in lectures you may be asked to try working out a problem, or talk to your neighbors; doing this is active participation.

Homework: Homeworks will be due weekly on **Tuesday nights at 11:59 pm, on Canvas**. A typical weekly homework will consist of two parts:

1. A problem set consisting of a few exercises taken from the book, for you to solve. You are encouraged to collaborate with classmates, you must think through and work through the solution on your own. You must typeset your solutions using TeX and submit your solutions as a PDF on Canvas. You will receive a temporary grade for your submission by the following Tuesday.
2. A revision of your homework submission from the previous week. You will be able to recuperate up to 75% of the points lost during the previous grading. For example, if on HW07 you receive a temporary grade of 80%, and then the following week you fix all your errors, your recorded grade for HW07 will be 95%.

There are a few additional homework policies:

- I will drop your lowest homework score at the end of the semester.
- You are allowed **one 24-hour extension to use one homework of your choice**; you must email me before the due date to let me know you will be using this extension. No other extensions will be granted except in documented extenuating circumstances.
- No other extensions/drops will be granted, except in documented extenuating circumstances. **All homework must be submitted by the last day of class, March 17, 2023.**
- We will generally use the "red line method" for grading homeworks. In short, when your homework submission is graded for the first time, the grader will indicate the first location where your proof fails or is otherwise unclear. It is your responsibility to figure out why the location was indicated, and to fix the error in the resubmission. See page 18 in the PDF of the textbook for more details on the red-line philosophy.

Midterm exams: Our in-class midterm exams will be traditional paper-and-pencil exams given during class time. Most questions will be free response, although we may occasionally have some multiple choice and/or true/false questions.

- No makeup exams will be given, and these may not be repeated. If you are absent from a scheduled midterm and your absence is excused (generally, this requires a medical or legal explanation, with supporting documentation), the grade for the missing exam will be replaced with your final exam grade.
- If you know in advance that you cannot be in attendance for a particular exam, discuss this with the instructor as early as possible. If you do not notify the instructor that you will be missing an exam beforehand, you will receive a score of 0 on that assignment.

Midterm exam dates are listed below. Any changes to the testing schedule will be announced by the instructor in class and/or by email; changes to these dates are very unlikely, and you should plan on taking the midterm exams on these dates.

Midterm Exam 1: **Wednesday, February 1**

Midterm Exam 2: **Wednesday, March 1**

Final exam: The final exam for this course is scheduled for **Thursday, March 23, 2023 at 6:00 PM**. This date and time is scheduled by the University and cannot be changed. **You must take the final to pass.**

- 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 semester, letter grades will be assigned using the following scale:

≥ 92	89 – 91	87 – 88	82 – 86	79 – 81	77 – 78	72 – 76	69 – 71	60 – 68	< 60
A	A-	B+	B	B-	C+	C	C-	D	F

- 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 semester 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: Laptops, cell phones, tablets etc., may not be used in class. You may not have a smart watch or other personal electronic device on your person during an exam; these devices must be stored in a backpack or bag. Your personal electronic devices must be in “silent” mode during class; a ringing or vibrating device disrupts the classroom experience. 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.

- I will make one possible exception to this policy. If you are legitimately using one of these devices for note taking purposes, you must request permission from me in person. I reserve the right to revoke permission if I feel this policy is being abused or becomes disruptive to others.

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

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

You may not discuss exams with other students until that assignment has been graded and returned to you, unless you have been given explicit permission to do so. 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. The following are examples of academic dishonesty and are prohibited in this course:

- getting someone (or an app) to work a problem for you and submitting the work as your own
- using unauthorized materials during a testing situation (e.g. midterms) including cheat sheets, the internet, another person's test paper, etc.
- having a cell phone or smart watch accessible during a testing situation, even if you are not using it to find problem solutions

This is not an exhaustive list; it is meant to give you an idea of prohibited activities.

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.