1 General Course Information

Instructor: Hanson Hao

Email: hhao@berkeley.edu. Please use this for logistics/administrative questions, and instead use office hours for mathematical questions.

Office: Evans 826

Course Website: https://math.berkeley.edu/~hhao/N55Summer2024

Course Description: Logic, mathematical induction, sets, relations, and functions. Introduction to graphs, elementary number theory, combinatorics, algebraic structures, and discrete probability theory. I will occasionally choose further topics to discuss, time permitting.

Location and Time: 12pm-2pm, Cory 241, M-F, June 17th-August 9th.

Prerequisites: Mathematical maturity appropriate to a sophomore math class (please talk to me if you are unsure). 1A-1B recommended. I might occasionally assume knowledge from 54 (e.g. matrices might occasionally appear), but not very much.

Required Textbook: Kenneth Rosen, Discrete Mathematics and its Applications, 8th edition.

2 Course Components

2.1 Lecture and Office Hours

There are 2 "in-class" hours per weekday, but the scheduling is such that time for "discussion section" is built into those 2 hours. However, since there are no TAs for this course, it does not make much sense to have a separate discussion section. Therefore, each class meeting will be comprised of two different components. Lecture will take place for the first ∼75-80 minutes of each meeting, starting on "Berkeley time". I will then hold office hours, in the same room, for the remainder of the time. This is time for you to ask questions about homework, get clarifications for material from lecture, etc.

I will hold two additional regular office hours per week, on **Wednesdays from 2:30-3:30pm** and **Fridays from 10-11am**, in my office.

2.2 Attendance

Attendance is not mandatory, but it is your responsibility to keep up with the material.

2.3 Homework

There will be 7 weekly homeworks, all due **Monday on Gradescope at 11:59pm**, starting Week 2. The homework due Monday of week n will cover the material from week $n-1$. Each homework will consist of some "warm-up problems," not to be written up and turned in, and then some (usually 7-8) problems that you will turn in. Homework will be graded for correctness, not just completion. Partial progress toward solutions on problems will be awarded partial credit, but simply writing answers down without explanation or justification will receive zero credit.

Homework problems should be written up clearly, legibly, and in complete English sentences, unless otherwise mentioned in the problem (the grader reserves the right to deduct points for particularly poorly-written solutions). It is preferred if you use a typesetting software like LaTeX to write your homeworks, although this is not a requirement and there are no extra points if you do so.

You are allowed and encouraged to discuss the homework problems with each other, but you must write up your solutions independently. You must also list the names of any classmates you have discussed the problems with on the first page of your submission.

Out of courtesy to the grader's time, please correctly tag each problem to the corresponding pages when uploading your homeworks to Gradescope. Please also do not submit homeworks consisting of a zoomed-out oversized single-page PDF (i.e. your work should be readable from the default zoom on your submission). Starting from HW2, any untagged problems or homeworks in violation of this policy may simply receive a score of zero.

Late homework will not be accepted, no exceptions. This is to ensure students keep up with the fast pace of the course, to allow me to release the solutions to the homeworks promptly, to give the grader enough time to grade all homeworks, and to ensure a uniform policy for all students. On the other hand, you will have **your lowest homework grade dropped** from your final grade, in case of sudden emergencies. Please be sure to not use this option too early on in the summer!

2.4 Exams

Per department policy, there will be a 1-hour midterm on **Tuesday, July 16th** and a 2-hour final exam on the **last day of class, August 9th**, both taking place during our usual class time. Please ensure that you do not have any conflicts with these time periods, because **there are no alternate exam times** (except for DSP accommodations; see below). In

particular, please do not arrange any travel to take place during the final exam. **You must take the final to pass the class.**

The midterm will cover the relevant sections of Chapters 1-5 of the book (see the schedule). The final exam will be cumulative.

For the midterm, you may bring **one** $8.5'' \times 11''$ **page of prepared notes**, and for the final, you may bring **two** $8.5'' \times 11''$ **pages of prepared notes**. No other resources may be used.

2.5 Regrade Requests

Regrade requests should be submitted through Gradescope, within **two days** of the scores being released. Students submitting a regrade request should first read through the provided answers, so they can review what is expected in a solution to that problem. The regrade request should clearly state where the grader made an *objective* mistake in grading the problem. Acceptable regrade requests include the grader overlooking a part of the solution (e.g. on another page), having an alternative correct solution marked incorrect, or incorrectly applying a rubric item. Subjective requests such as "There should be less points taken off for this" and "I believe this was only a minor error," or *post hoc* explanations such as "I wrote multiple things down, but my true answer is X and other answers were just scratch work" are not acceptable and will be disregarded. The grader will then re-evaluate the entire problem to determine if the score should be updated; this includes the possibility of the updated score being lower than the original score.

Because determining how much progress towards a full solution was made and the awarding of partial credit are inherently subjective, please do not email me asking me to overrule the grader's decisions, as I will not do this unless in extremely exceptional circumstances.

3 Grading

The grade will be determined as follows: **60% homework, 15% midterm, 25% final exam**. This means that each homework is worth 10% of your final grade, after dropping the lowest score. The homeworks, midterm, and final will not be individually curved. There is no "clobber" policy.

The default grade distribution is determined as follows:

Raw Percentage	Default Grade
$x \geq 100$	A+*
$x \geq 92.5$	A
$x \geq 85$	A-
$x \geq 82$	B+
$x \geq 78$	B
$x \geq 75$	B-
$x \geq 72$	C+
$x \geq 68$	C
$x \geq 65$	C-

For example, if your final percentage is at least an 82%, you are guaranteed at least a B+. Cutoffs for grades below C- remain at my discretion. **There will be no rounding of percentages** (e.g. an 81.9% is a B in the default grading distribution, not a B+).

I plan to be fairly generous with the final curve. For instance, if the final class median is lower than 85%, but still reasonable, the cutoff for an A- may be very likely shifted to that median. Other cutoffs for A-/A, B/B+, etc. may also be shifted depending on the median, but similarly will remain at my discretion.

The only caveat is the grade of A+. An A+ is earned only for a raw grade of at least 100%. There will be bonus "challenge" problems appearing on some of the homeworks and on the exams in order to help facilitate this.

4 Miscellany

4.1 Accessibility and Accommodations

The University of California is committed to providing access, equal opportunity and reasonable accommodations for all students. These resources include exam proctoring and accommodations in distraction-free environments and with extra time as well as note taking. Please contact the DSP Office to initiate requests for accomodations.

If you need disability-related accommodations in this class, if you have emergency medical information you wish to share with me, or if you need special arrangements in case the building must be evacuated, please inform me as soon as possible (**no later than the end of the first week**) so that we can discuss any modified course policies. Accomodation requests for the midterm must be sent to me by **Monday, July 1**, so I have time to make the appropriate arrangements. For the same reason, accomodation requests for the final exam must be sent to me by **Monday, July 22**.

4.2 Academic Honesty

All work in this class is bound by the Berkeley Honor Code: "As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others."

All exam responses are understood to be your own work, consulting only the resources explicitly allowed for the exam. Homework is allowed and even encouraged to be discussed between students, but students are expected to write up their solutions independently. Keep in mind that simply copying solutions from another student or from the web is a waste of everybody's time, as well as a violation of the expected standard of academic integrity. Any copying from other students on homework or exams, or consulting resources not explicitly allowed on exams, is considered cheating and will result in failure of the course and an academic misconduct report filed.

4.3 Emergencies

In the case of emergency situations that make it difficult to meet in person (e.g. poor air quality), we will attempt to continue the lectures over Zoom, switching to remote instruction for as long as the situation necessitates. If the disruption is severe enough, the coursework and grading may be modified as well.

5 Advice

The following is mostly adapted from here.

- For some advice in writing mathematics, please see here, here, and here.
- Homework is an essential part of your learning. Copying someone else's homework, asking ChatGPT for the answers[1], or not trying to complete the homework will hurt your understanding of the material and your grade (and consequently your ability to apply the material elsewhere). In fact, *struggling with exercises is the only way to become better at mathematics.*
- Homework will have problems you have not seen in class, and those problems can sometimes be even harder than the problems done in class, so **start early!**. Math classes, beginning with 55, explain main ideas and results, discuss motivation behind them, and show how to use them. Homework is intended to challenge your understanding of the material. Only by being pushed beyond your level of comfort can you truly

[1]This is especially not recommended, because I have experimented with feeding some Math 55-relevant problems to ChatGPT, and more often than not it commits a major error that is easily spotted by a human reader.

understand the concepts and broaden your mathematical skills. There will often be homework problems that you will not know how to do immediately—this is normal! Getting stuck on problems or being confused about the material is a normal part of a proof-based math class. If you never get stuck and always know what to do instantly, you are probably wasting your time in this class. If you get stuck, and remain so after mulling things over in your mind, ask me for help.

- Exams will include questions that you have not done in class or in homework, within reason. The goal of exams is to probe if you understand the concepts in addition to applying procedures, not to confirm that you can memorize previously-seen examples. Some exam questions may closely resemble those seen in homework or class, but others may check your understanding of the material by using it in a new context.

- Math is cumulative, and this class is *very* fast-paced due to the shortened schedule, so don't let confusion pile up: ask questions in office hours, tutoring, class, to classmates, etc. **Asking for help is strongly encouraged**. Do not blindly memorize things! If the motivation for a definition or the meaning of a result or method is unclear, ask about it.

- Build up understanding of ideas first in a special case before the general case (this often helps you retain a concept much better than rote memorization). After reading a definition or the statement of a result, work out what it is saying in some special cases (e.g., finite sets, three numbers instead of n numbers, etc.). When thinking about a worked example, make sure all steps make sense and are consistent with everything else. If you encounter any inconsistency or something makes no sense even as a logical statement, sort out the confusion right away or make a note to come back to it soon.

- Read the homework and exam solutions carefully, even for problems that you solved correctly. I will try to write "model solutions" to be released, so they are a good way of self-assessing the quality of your proof-writing. If a solution uses a different or faster method than you did, try to understand it. If you wrote a correct proof, but didn't fully understand what you were doing, talk to someone to understand it.

- More than in perhaps any other field, *definitions* are absolutely crucial in mathematics. **Read and internalize definitions very carefully.** Make sure the syntax makes sense, terms make sense as written, and that they "work" on some examples you make in special cases (plug in numbers, etc.).

- For additional help, you are encouraged to visit the Student Learning Center (SLC) for drop-in peer tutoring.