Math 2001 Discrete Mathematics
Syllabus

Instructor

Charlotte Aten
Website: aten.cool
Email: charlotte.aten@colorado.edu

Lectures

Time: MWF 1220–1310
Location: Eaton Humanities Bldg 190
See figure 1 for a tentative lecture schedule.

Office hours

Time: MW 1320–1410
Location: Math 307 (my office)
If these times don't work for you and you would like to chat, please reach out
to make other arrangements with me, such as a meeting via Zoom.

Textbook

Discrete Mathematics: An Open Introduction (4th edition) by Oscar Levin
Available online at https://discrete.openmathbooks.org/dmoi4.html
A print copy can be obtained from https://www.routledge.com/Discrete-Mathematics-An-Open-Introduction/Levin/p/book/9781003589907

Webpage

The course webpage can be found at https://aten.cool/courses/2026/spring/2001.html.
This is where you will find the latest version of the syllabus, lecture slides, home-
work assignments, and past quizzes.

Prerequisites

Students taking Math 2001 should be familiar with the methods of differential
and integral calculus covered in Math 1300, Math 1310, APPM 1345, APPM
1350 or an equivalent course.

Drop date

You can drop this course with a 100% refund any time up to and including
January 23, 2026. It will also be removed from your academic record. From
January 24 onward you will have to take a W on your transcript if you would

like to drop the course, which is referred to as a «withdrawal». See here for more detailed information.

Course learning objectives

This course provides experiences to help strengthen the student's ability to:

- Work with elementary set theory, including the notions of membership, containment, and set operations.

- Use the formal set-theoretic notion of a function and associated notions such as image, preimage, injectivity, and surjectivity.

- Perform calculations in propositional and first-order logic.

- Use rigorous arguments in the construction of mathematical proofs.

- Appropriately apply proof techniques including direct proof, proof by contradiction, and proof by induction.

- Apply the above to the study of combinatorial graphs, including proofs of results pertaining to trees, planarity, and coloring.

- Perform counting arguments involving permutations and combinations.

- Compute probabilities using the rules of probability and counting techniques.

Class structure

Lectures occur thrice a week and are 50 minutes long. On certain days the entire lecture period will consist of a quiz instead. A tentative lecture schedule may be found in figure 1.

Week	Date	Sections covered	Skills covered
0	Friday, January 9	5.1.1	S1
1	Monday, January 12	5.1.2	S1
1	Wednesday, January 14	5.1.2	S1
1	Friday, January 16	5.1.3, 5.1.4	S1
2	Wednesday, January 21	5.1.3	S1
2	Friday, January 23	5.2.1	S2
3	Monday, January 26	5.2.2	S2
3	Wednesday, January 28	5.2.3	S2
3	Friday, January 30	Quiz	
4	Monday, February 2	1.1	S3
4	Wednesday, February 4	1.2	S3
4	Friday, February 6	1.3	S3
5	Monday, February 9	1.4.1, 1.4.2	S4
5	Wednesday, February 11	1.4.2	S4
5	Friday, February 13	1.4.3	S4
6	Monday, February 16	1.4.4	S4
6	Wednesday, February 18	1.4.4	S4
6	Friday, February 20	Quiz	
7	Monday, February 23	2.1	S5
7	Wednesday, February 25	2.2	S5
7	Friday, February 27	2.3	S5
8	Monday, March 2	2.5.1, 2.5.2	S6
8	Wednesday, March 4	2.5.2	S6
8	Friday, March 6	2.5.3	S6
9	Monday, March 9	2.6.1, 2.6.2	S7
9	Wednesday, March 11	2.6.3, 2.6.4	S7
9	Friday, March 13	Quiz	
10	Monday, March 23	3.1	S8
10	Wednesday, March 25	3.2	S8
10	Friday, March 27	3.2	S8
11	Monday, March 30	3.3	S8
11	Wednesday, April 1	3.3	S8
11	Friday, April 3	3.3	S8
12	Monday, April 6	3.4	S8
12	Wednesday, April 8	3.4	S8
12	Friday, April 10	Quiz	
13	Monday, April 13	3.7.1, 3.7.2	S9
13	Wednesday, April 15	3.7.3	S9
13	Friday, April 17	3.7.3	S9
14	Monday, April 20	3.7.4	S9
14	Wednesday, April 22	3.7.4	S9
14	Friday, April 24	Review	

Figure 1: Tentative lecture schedule

Slides

I use slides in addition to writing on the board during lectures. I will post the slides I use on the course webpage some time after class. These slides are not a substitute for taking your own notes (or getting them from a friend if you miss class) and are by no means going to contain a complete description of everything I say or compute during class. They can be a helpful supplement to your own, more detailed notes, however.

Course materials

In addition to the textbook, students should bring an ample supply of blank paper and writing utensils. Calculators will not be required and will not be allowed on quizzes.

Homework

We will be using Gradescope for biweekly homework assignments. Make an account using your CU email address and use the course entry code «3DXXVZ» to join the course on that platform. Each homework assignment is usually due on a Sunday at 2359 on Gradescope. The assignment itself may be found on the course webpage as soon as it is available to work on. See this guide for submitting an assignment on Gradescope and this one for instructions on how to submit your work as a PDF. Consult figure 2 to see when each assignment is due.

Homework	Weeks	Due date
1	1, 2	Sunday, January 25
2	3, 4	Sunday, February 8
3	5, 6	Sunday, February 22
4	7, 8	Sunday, March 8
5	9, 10	Sunday, March 29
6	11, 12	Sunday, April 12
7	13, 14	Sunday, April 26

Figure 2: Tentative homework schedule

Quizzes

Every three weeks we will have a 50-minute quiz during Friday's lecture period, as per the schedule in figure 3. During this quiz you will be able to attempt to suffice or excel at any of the skills we have covered thus far in the course. (See more detail about skills below.)

Each quiz problem will be graded as either «substantially correct» or «not substantially correct». To count towards sufficing or excelling at a skill you need to receive a grade of «substantially correct» on the relevant problem. You

do not need to be absolutely perfect to be «substantially correct». For example, small arithmetic errors or mistakes copying down a formula from one line to the next will not prevent you from getting a grade of «substantially correct», **as long as your error doesn't make the problem easier**. Conceptual misunderstandings will always be counted as «not substantially correct».

In order to suffice at a skill you must get a «substantially correct» on one relevant quiz problem. In order to excel at a skill you must get a «substantially correct» on two relevant quiz problems, not necessarily during the same quiz period. You may attempt two problems for the same skill on the same quiz if you have not already excelled at that skill, even if you have sufficed at that skill on a previous quiz.

Week	Date
3	Friday, January 30
6	Friday, February 20
9	Friday, March 13
12	Friday, April 10

Figure 3: Tentative quiz schedule

In figure 4 you can find suggested problems from the text for extra practice.

Skill	Suggested problems (Textbook section: Problem numbers)
S1	5.1.5: 1-12, 14-24, 27-30
S2	5.2.4: 1-10, 12-21, 26-30
S3	1.1.5: 1-8; 1.2.5: 1-5; 1.3.7: 1-9

Figure 4: Practice problems

Final exam

The final exam for this course is merely one final, long quiz period in which to attempt to suffice or excel at any skills you have remaining. The date and location of the final exam will be announced later in the semester.

Grading

This course will be graded on proficiency. This means that, rather than accumulating a total number of points on various exams and homework assignments throughout the semester and having your numerical scores/averages converted into a letter at the end, this course has a collection of 10 skills, which are described in figure 5.

Skill	Description
S1	**Sets**: Use concepts from elementary set theory, such as membership and containment. Compute with basic set operations.
S2	**Functions**: Use the formal set-theoretic notion of a function and associated notions such as image, preimage, injectivity, and surjectivity.
S3	**Logic**: Translate between informal statements and statements in proposition or first-order logic. Perform calculations in first-order logic, including demonstrating equivalence via truth tables.
S4	**Proofs**: Use proof techniques like direct proof, proof by contrapositive, and proof by contradiction in rigorous natural-language arguments.
S5	**Graphs**: Prove results about combinatorial graphs. Apply facts about trees and Eulerian paths/circuits.
S6	**Graph coloring**: Prove results about graph coloring. Establish the chromatic number (or index) of a graph.
S7	**Relations**: Determine whether a relation is reflexive, symmetric, or transitive. Test whether a relation is an equivalence relation.
S8	**Counting**: Perform counting tasks involving permutations and combinations. Prove the correctness of combinatorial formulas.
S9	**Probability**: Use the rules of probability and counting techniques to compute probabilities.
S10	**Practice material**: The homework assignments are each graded out of a total of 10 points. Thus, the maximum possible score is 70. A total score of 60 is enough to excel at this skill, while a total score of 45 is enough to suffice at this skill.

Figure 5: Skills

Final grades are assigned according to figure 6. If I later choose to deviate from this, it will only be to assign everyone higher letters than originally indicated. I will use my judgment to decide where the + or - grades should fall at the end of the semester.

Grade	Skills (excel)	Skills (suffice)
A	7	10
B	4	9
C	2	8
D	0	7

Figure 6: Final grades

Honor code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code. Violations of the Honor Code may include but are not limited to: plagiarism (including use of paper writing services or technology [such as essay bots]), cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. Understanding the course's syllabus is a vital part in adhering to the Honor Code.

All incidents of academic misconduct will be reported to Student Conduct & Conflict Resolution: StudentConduct@colorado.edu. Students found responsible for violating the Honor Code will be assigned resolution outcomes from the Student Conduct & Conflict Resolution as well as be subject to academic sanctions from the faculty member. Visit Honor Code for more information on the academic integrity policy.

Accommodation for disabilities, temporary medical conditions, and medical isolation

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the Disability Services website. Contact Disability Services at 303-492-8671 or DSinfo@colorado.edu for further assistance. If you have a temporary medical condition, see Temporary Medical Conditions on the Disability Services website.

If you have a temporary illness, injury or required medical isolation for which you require adjustment, you should contact me as soon as reasonably possible in order to make other arrangements. I understand that it may not always be possible to let me know you'll have to turn in an assignment late in advance, but it will be easier for both of us if you can reach out sooner than later.

Accommodations for religious obligations

Campus policy requires faculty to provide reasonable accommodations for students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Please communicate the need for a religious accommodation in a timely manner. In this class, all homework, quizzes, and lectures are scheduled from the beginning of the course, so make sure to look over this document and reach out as soon as you can to resolve any scheduling conflicts. I will notify the class via email should anything in the course schedule change. See the campus policy regarding religious observances for full details.

Preferred student names and pronouns

CU Boulder recognizes that students' legal information does not always align with how they identify. If you wish to have your preferred name (rather than your legal name) and/or your preferred pronouns appear on your instructors' class rosters and in Canvas, visit the Registrar's website for instructions on how to change your personal information in university systems.

Classroom behavior

Students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote, or online. Failure to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, marital status, political affiliation, or political philosophy. Additional classroom behavior information:

- Student Classroom and Course-Related Behavior Policy
- Student Code of Conduct
- Office of Institutional Equity and Compliance

Sexual misconduct, discrimination, harassment and/or related retaliation

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. University policy prohibits protected-class discrimination and harassment, sexual misconduct (harassment, exploitation, and assault), intimate partner abuse (dating or domestic violence), stalking, and related retaliation by or against members of our community on- and off-campus. The Office of Institutional Equity and Compliance (OIEC) addresses these concerns, and individuals who have been subjected to misconduct can contact OIEC at 303-492-2127 or email OIEC@colorado.edu. Information about

university policies, reporting options, and OIEC support resources including confidential services can be found on the OIEC website.

Please know that faculty and graduate instructors must inform OIEC when they are made aware of incidents related to these policies regardless of when or where something occurred. This is to ensure the person impacted receives outreach from OIEC about resolution options and support resources. To learn more about reporting and support a variety of concerns, visit the Don't Ignore It page.

Mental health and wellness

The University of Colorado Boulder is committed to the well-being of all students. If you are struggling with personal stressors, mental health or substance use concerns that are impacting academic or daily life, please contact Counseling and Psychiatric Services (CAPS), located in C4C, or call (303) 492-2277, 24/7.