

Math 381, Fall 2020

Discrete Mathematics

Credit hours: 3

Department: Mathematics

Time/location: MWF, 10:40am–11:30pm in Zoom 965 5894 0970

Instructor: David Rose

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Teaching Assistant:

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Target audience: Students interested in learning the basics of abstract mathematics, and how to construct logical (mathematical) arguments.

Course prerequisites: Math 232

Course goals and learning objectives: To learn about the basic structures underlying advanced mathematics. Specifically, to understand logic, sets, methods of proof, and relations, and to apply these concepts to uncover the rich structure underlying familiar concepts such as the integers, counting, and probability.

Course requirements: To attend zoom lectures, actively engage with the course material, and develop problem-solving skills via completion of homework assignments.

Zoom lectures/etiquette: Due to the COVID-19 pandemic, this course will be taught virtually via zoom. The lectures will be given synchronously, and you are expected to attend. (Prof. Rose may record/distribute lectures if possible, but you will get much more out of this course if you attend the lectures live and participate.)

Please keep your camera on (whenever possible) and your microphone muted during lecture. If Prof. Rose asks a question to the class, feel free to unmute and answer. If you have a question, please “raise your hand” (virtually); after being acknowledged, you are welcome to unmute and ask your question. Lastly, the zoom “lecture room” is password protected, for our security; please do not distribute the password.

Course communication via Piazza Unfortunately, the following holds for this course:

$$\# \text{ of students} > \# \text{ of TAs} = \# \text{ of Prof. Roses.}$$

To ensure that questions are addresses in a prompt and organized manner, we will utilize Piazza, an online Q&A forum for our course, where students can post questions, and have them answered by fellow students, TAs, or Prof. Rose. Please sign up here:

<https://piazza.com/unc/fall2020/math381002>

or via the link on the course website.

All questions that are appropriate for public discussion (i.e. concerning mathematical content, general course logistics, etc.) should be asked via a **public** Piazza post. Private Piazza communication should be reserved for questions of a personal nature, or those containing sensitive information.

In order to encourage Piazza use, direct email communication to Prof. Rose or Franklin should only be used in exceptional circumstances, and will typically only be addressed in such cases.

Course content: We aim to cover select material in Chapters 1, 2, 4, 5, 6, 7, and 9 of Rosen, as time permits. Here is a preliminary schedule (with corresponding book sections):

	Dates	Topics
Week 1	8/10, 8/12, 8/14	Propositional logic (1.1, 1.3)
Week 2	8/17, 8/19, 8/21	Predicate Logic (1.4)
Week 3	8/24, 8/26, 8/28	Nested Quantifiers and Rule of Inference (1.5, 1.6)
Week 4	8/31, 9/2, 9/4	Rules of inference (1.6)
Week 5	9/9, 9/11	Methods of Proof (1.7)
Week 6	9/14, 9/16, 9/18	Proof Strategy (1.8) and Midterm I
Week 7	9/21, 9/23, 9/25	Sets (2.1, 2.2)
Week 8	9/28, 9/30, 10/2	Functions (2.3)
Week 9	10/5, 10/7, 10/9	Number theory (4.1, 4.2)
Week 10	10/12, 10/14, 10/16	More number theory (4.2)
Week 11	10/19, 10/21, 10/23	Induction (5.1, 5.2) and Midterm II
Week 12	10/26, 10/28, 10/30	Relations (9.1, 9.5)
Week 13	11/2, 11/4, 11/6	The pidgeonhole principle (6.2) and Permutations (6.3)
Week 14	11/9, 11/11, 11/13	Combinations (6.3) and binomial coefficients (6.4)
Week 15	11/16	Wrap up and review
Final Exam	TBD at TBD	

Professor Rose reserves the right to deviate from the listed schedule as needed.

A note about the textbook: We are using the **8th edition** of *Discrete Mathematics and Its Applications* by Kenneth Rosen. A special, price-reduced loose leaf version of this text is

available at the bookstore. Although the content is similar to older editions, the homework problems will be assigned from the 8th edition, so if you have an older version be sure to look at a friend's/classmate's 8th edition when working on problems.

Grades: Your grade will be based on the following:

- Homework (20%)
- Mid-term examinations (40%): will take place in class on **September 18th** and **October 23rd**.
- Cumulative final examination (40%) on **TBD at TBD**.

Although not a formal component of the grading scheme, students are expected to regularly attend, and actively participate in, zoom lectures.

Raw final course grades will be curved (typically with the average score set no lower than a B-), and the curve will be no harsher than the standard 10-point UNC grading system. An approximate curve for the midterm will be announced when the exams are returned.

Exam protocol: Exams will be administered online via Gradescope, and monitored in real time via Zoom. During the exam, you are required to show your face as well as your work area and immediate surroundings at all times. At the end of the exam time, you will be required to submit through Gradescope within 15 minutes of the end of the exam period. If you are not able to accomplish this because of technological or personal reasons, please work with Prof. Rose to develop an alternate testing approach.

Missed midterm exams will be treated on a case-by-case basis. If the absence is excused, the final exam grade will be substituted in place of the missed midterm. **No** make-up midterm will be given.

Homework: In order to properly learn the course material, it is crucial to develop the necessary problem-solving skills. As such, homework will be assigned daily on the course website, and collected weekly via Gradescope:

<https://www.gradescope.com/courses/156655>

You will need the passcode: MKV2ZV. As is the case with many standard textbooks, you may be tempted to search for homework solutions online; I urge you **not** to do so, as 1) you will learn best by struggling with the problems, and eventually fighting through your confusion (which won't happen if you look up answers), and 2) it is a violation of the UNC Honor Code.

Academic integrity: Don't cheat. Don't act dishonestly. During my four years at UNC I've caught 7 cheaters, and the consequences for these students were much, much worse than the (low-ish) grades they would have received. It's not worth it.

Syllabus changes: Professor Rose reserves the right to make changes to the syllabus, including test dates, should any unforeseen circumstances occur. These changes will be announced as early as possible so that students can adjust their schedules.