

Math 381, Spring 2019

Discrete Mathematics

Credit hours: 3

Department: Mathematics

Time/location: MWF, 2:30pm–3:20pm in Phillips 301

Instructor: David Rose

Office hours: 3:20pm–4:20pm on Wednesdays and 10am–11am on Thursdays in Phillips 302 (or by appointment)

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Teaching Assistant:

- Derrick Nowak
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Office hours: 3:30pm–4:30pm Thursdays in Phillips 413

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 lecture, actively engage with the course material, and develop problem-solving skills via completion of homework assignments.

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 addressed 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/spring2019/math381003>

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, with private Piazza communication 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 Derrick 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	1/9, 1/11	Propositional logic (1.1)
Week 2	1/14, 1/16, 1/18	Propositional equivalence (1.3), predicates (1.4)
Week 3	1/23, 1/25	Quantifiers (1.4, 1.5)
Week 4	1/28, 1/30, 2/1	Rules of inference (1.6)
Week 5	2/4, 2/6, 2/8	Introduction to proofs (1.7)
Week 6	2/11, 2/13, 2/15	Proof Strategy (1.8)
Week 7	2/18, 2/20, 2/22	Sets (2.1, 2.2)
Week 8	2/25, 2/27, 3/1	Functions (2.3)
Week 9	3/4, 3/6, 3/8	Number theory (4.1, 4.2)
Spring break!	3/11 – 3/15	No lecture!
Week 10	3/18, 3/20, 3/22	More number theory (4.2) and induction (5.1)
Week 11	3/25, 3/27, 3/29	Strong induction (5.2) and relations (9.1)
Week 12	4/1, 4/3, 4/5	Equivalence relations (9.5) and Counting (6.1)
Week 13	4/8, 4/10, 4/12	The pidgeonhole principle (6.2) and Permutations (6.3)
Week 14	4/15, 4/17	Combinations (6.3) and binomial coefficients (6.4)
Week 15	4/22, 4/24, 4/26	Probability theory (7.1, 7.2)
Final Exam	5/7 at 8:00am	

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 **February 15th** and **March 29th**.
- Cumulative final examination (40%) on **May 7th at 8:00AM** in Phillips 381

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

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 (on the following Wednesday). 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.

Device policy: Phones may not be used during lecture. Laptops and tablets may only be used for note taking.

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.