

Math 131: Discrete Math

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Student Help Hours (Formerly known as Office Hours) Tuesday 10 am - noon and Wednesday 10:50 - 11:50 am, or by appointment. Come by my office or join me on Zoom, whichever is easier for you.

Course Description This course provides an introduction to both theoretical and applied mathematical topics not covered in a calculus course, and introduces the ideas and techniques of formal logic and mathematical proofs.

Learning Outcomes By the end of the course, successful students will be able to:

- produce mathematical proofs
- understand the different types of proofs
- critique proofs on correctness
- understand the basics of graph theory and recursion

Course Materials

Textbook: *Discrete Mathematics with Applications* Epp, 5th edition
Devices: access to a computer

Important Dates

We will have six in-class quizzes and two portfolio check days.

If you have a conflict with one of these dates please email me ASAP.

Quiz 1	Monday 1/30, in class
Quiz 2	Monday 2/13, in class
Quiz 3	Friday 3/3, in class
Portfolio Check Day	Monday 3/20, in class
Quiz 4	Friday 3/24, in class
Quiz 5	Monday 4/3, in class
Quiz 6	Wednesday 4/19, in class
Portfolio Check Day	Tuesday 4/25, in class

Course Grades

The final course grade is determined in the following way:

Homework & Activity Responses	34%
Quizzes (4% each)	24%
Midterm Portfolio	15%
Final Portfolio	27%

A grade scale will be determined after final grades are computed, but will be no worse than the scale given below. Attendance and class participation will be considered when determining marginal grades.

	B+	87-89	C+	77-79	D+	67-69		
A	93-100	B	83-86	C	73-76	D	63-66	F 0-59
A-	90-92	B-	80-82	C-	70-72	D-	60-62	

Attendance Policy

Class attendance is expected because doing well in this class is hard if you aren't here to work on the material with us. However, life happens and sometimes you have to miss. If you know in advance you're going to miss class, make sure you turn in any work due that day (Inquire makes this easy!). Let me know if you need help learning the material we're going to cover, whether that means getting connected with someone who will share their notes or coming to office hours with questions. If you are going to miss a quiz, let me know as soon as you can so we can figure out how to handle that. If you don't know in advance (because sometimes life happens unexpectedly), talk with me as soon as you can about what you can make up and how to get caught up. I will be as generous as I can while still keeping the class fair for all students.

Homework I will assign a graded homework problem each day. The homework you turn in should be a neat and organized final draft of your work, not a rough draft. Submit your homework in class OR via Inquire as a PDF or Word file. (Picture files may not allow me to give you comments, so copy/paste pictures into Word or get a PDF scanner app on your phone.) These problems are due at the beginning of the next class so you can ask questions about them before we start new material. **Since I can't accept homework turned in after we've done it in class, late homework will usually not be accepted.** If you are unable to complete the homework on time for some reason, please contact me about that as soon as you can so we figure out how to handle the situation. **You may work with your classmates on the homework, but you must write up your homework alone (or with input from me).** This means you can't look at anyone else's work while doing your write up.

Co-Curricular Activities The MCSP department and Roanoke College offer many opportunities to engage with mathematical ideas outside of classes. Members of this class are encouraged to attend many of these activities, however attending at least one is mandatory. Examples include MCSP Conversation Series talks and student research showcases - if you're unsure if a given activity makes sense for this purpose, please email me to ask. After you attend (preferably within one week), submit a brief response to the activity. Your response will count as part of your homework grade.

Quizzes We will have six quizzes throughout the term. Each quiz will focus on the material learned since the last quiz, but will (necessarily) contain previous material.

Portfolios In place of midterm and final exams, you will prepare and turn in two portfolios of polished problems covering the major topics of the course. The Midterm Portfolio will cover topics from roughly the first third of the course and will be due on Monday March 20. The Final Portfolio will cover the rest of the course and will be due on Monday May 1. You should definitely be working on these portfolios throughout the semester! I am happy to talk about your portfolio with you, but you may not discuss it with anyone else except for our two "portfolio check days" where you will review your portfolios with a small group of classmates.

Daily Problems After each section I will assign some problems from the book for practice. These will not be collected - the answers are in the back and they are your chance to make sure you understand the material and to get help whenever you realize you need it. Feel free to work with other students on these problems.

Covid Policy If you have a temperature of 100.4 or higher or other coronavirus symptoms, don't come to class. Call Health Services IMMEDIATELY. Do not come to class or go to any public area on campus. If you give Health Services permission they can notify me that you have consulted them about coronavirus symptoms so I know what's going on and we can talk about how to get you excused from any work you miss. If Health Services informs you that you should isolate and not attend class for multiple days or weeks, please let me as soon as you can so we can make a plan to keep you caught up in the course. All absences caused by isolation ordered by Health Services will be excused.

Mask Policy Unless the college changes its policy, face coverings/masks are no longer required. However, anyone is welcome to wear a mask for some or all of the semester. If you feel sick and plan to come to class, please wear a mask over your nose and mouth! (The rest of the class thanks you in advance.)

Expected Work Policy This course expects you to spend at least 12 hours of work each week inside and outside of class.

Academic Integrity I expect all of you to follow the Academic Integrity policies of Roanoke College as well as the guidelines for each assignment. All graded work should be your own work! If you ever have questions about how these

Extra Resources Subject tutoring is available through the Center for Teaching and Learning (in Fintel Library).

Special Needs If you get any academic accommodations in this course, please let me know and provide your documentation as soon as you can - preferably within the first 2 weeks of the semester. (Check with the Center for Teaching and Learning for their scheduling guidelines.)

policies apply to our class please contact me. Any violations of these policies will automatically be turned over to the Academic Integrity Council.

Pandemic Planning If college policies change due to the pandemic, I will distribute an updated syllabus. I will email you our new plan and post details on Inquire. You should email me with any questions or challenges that arise.

Course Schedule

The following schedule is approximate and subject to change except for the test dates. It should give you an idea of the timing of the topics covered and assignments.

M	M 1	Final Portfolio due by 5 pm	
Day	Date	Topic	Other Assignments

W	J 18	1.1 – 1.3: Intro to Mathematical Language	
F	J 20	1.4: Language of Graphs	
M	J 23	2.1: Logical Forms and Equivalence	
W	J 25	2.2: Conditional Statements	
F	J 27	2.3: Valid and Invalid Arguments	
M	J 30	Logic Review	Quiz 1
W	F 1	3.1: Predicates and Quantified Statements I	
F	F 3	3.2: Predicates and Quantified Statements II	
M	F 6	3.3: Statements Containing Multiple Quantifiers	
W	F 8	3.4: Arguments with Quantified Statements	
F	F 10	4.1: Direct Proof and Counterexample	
M	F 13	Argument Review	Quiz 2
W	F 15	4.2: Writing Advice	
F	F 17	4.3: Rational Numbers	
M	F 20	4.4: Divisibility	
W	F 22	4.5: Division into Cases	
F	F 24	4.7: Contradiction and Contraposition	
M	F 27	4.8: Classical Theorems	
W	M 1	4.9: Application: The Handshake Theorem	
F	M 3	Proof Review	Quiz 3
Spring Break			
M	M 13	5.1: Sequences	
W	M 15	5.2: Mathematical Induction I	
F	M 17	Portfolio Check Day	
M	M 20	5.3: Mathematical Induction II	Midterm Portfolio Due
W	M 22	Induction Worksheet	
F	M 24	Induction Review	Quiz 4
M	M 27	5.6: Defining Sequences Recursively	
W	M 29	5.7: Solving Recurrence Relations by Iteration	
F	M 31	6.1: Set Theory	
M	A 3	Recurrence Review	Quiz 5
W	A 5	6.2: Set Properties	
Good Friday			
M	A 10	6.3: Set Proofs and Disproofs	
W	A 12	7.1: Functions	

F	A 14	7.2: One-to-One and Onto	
M	A 17	10.1: Graphs: Trails, Paths, and Circuits	
W	A 19	Set and Function Review	Quiz 5
F	A 21	10.4: Trees: Examples and Basics	
M	A 24	10.6: Spanning Trees	
Tu	A 25	Portfolio Check Day	