

Math 131: Discrete Math

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Office Hours Monday noon – 1 pm and 2:15 – 3:15 pm, Tuesday 11:45 am – 1 pm, Wednesday 10 – 10:45 am and noon – 1 pm, Friday noon – 1 pm, or by appointment.

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 1/31, in class
Quiz 2	Monday 2/14, in class
Quiz 3	Friday 3/4, in class
Portfolio Check Day	Friday 3/18, in class
Quiz 4	Friday 3/25, in class
Quiz 5	Monday 4/4, in class
Quiz 6	Wednesday 4/20, in class
Portfolio Check Day	Tuesday 4/26, in class

Course Grades

The final course grade is determined in the following way:

Participation	8%
Homework & Activity Responses	30%
Quizzes	20%
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		

Participation

As we work through the course material, I expect you to come to class prepared and willing to contribute to our progress. There will be many ways to do this, including: contributing to class problem solving efforts, helping review your classmates' portfolios, joining class discussions, and asking good questions. During the online portion of the class, this includes having your video on! (Please let me know if there are technical reasons you can't use your video so I don't penalize you for having it off.)

Homework There will be a graded homework problem assigned each class and due by the beginning of the next class. **Late homework will not be accepted.** The homework you turn in should be a neat and organized final draft of your work, not a rough draft. Homework will be on writing as well as on mathematical correctness.

Submit your homework (as a PDF or Word file) using the links on Inquire. **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. Within one week of attendance you must 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 21. The Final Portfolio will cover the rest of the course and will be due on Saturday April 30. You should definitely be working on these portfolios throughout the semester! You may not discuss or share your portfolio with anyone but me, 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 if you realize you need it. Feel free to work with other students on these problems.

Attendance Policy Class attendance is expected. However, 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. In order for your absence to be excused, you must give Health Services permission to notify me that you have consulted them about coronavirus symptoms. All absences caused by consultation with Health Services about coronavirus symptoms will be treated as if you'd discussed them with me beforehand. **If your absence is not coronavirus related and you have not discussed it with me beforehand, you will be unable to make up any work missed. Whatever the reason, if you have to miss class, you are responsible for learning all material covered that day.** If Health Services informs you that you should isolate and not attend class for multiple days or weeks, inform me so that we can make a plan to keep you current in the course.

Mask Policy Until the college changes its policy, face coverings/masks must be worn over the mouth and nose by all students and instructors in classrooms and hallways of academic buildings. **Students who come to class without a face mask that is being worn properly will be asked to leave and will be readmitted only after they are wearing one.**

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

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

Special Needs If you have a disability that may require an accommodation in this course, please let me know and provide your documentation within the first 2 weeks of the semester. I must have your documentation at least 48 hours prior to any accommodation I make. (Check with the Center for Teaching and Learning for their scheduling guidelines.)

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.

Day	Date	Topic	Other Assignments
W	J 19	1.1 – 1.3: Intro to Mathematical Language	
F	J 21	1.4: Language of Graphs	
M	J 24	2.1: Logical Forms and Equivalence	
W	J 26	2.2: Conditional Statements	
F	J 28	2.3: Valid and Invalid Arguments	
M	J 31	Logic Review	Quiz 1
W	F 2	3.1: Predicates and Quantified Statements I	
F	F 4	3.2: Predicates and Quantified Statements II	
M	F 7	3.3: Statements Containing Multiple Quantifiers	
W	F 9	3.4: Arguments with Quantified Statements	
F	F 11	4.1: Direct Proof and Counterexample	
M	F 14	Argument Review	Quiz 2
W	F 16	4.2: Writing Advice	
F	F 18	4.3: Rational Numbers	
M	F 21	4.4: Divisibility	
W	F 23	4.5: Division into Cases	
F	F 25	4.7: Contradiction and Contraposition	
M	F 28	4.8: Classical Theorems	
W	M 2	4.9: Application: The Handshake Theorem	
F	M 4	Proof Review	Quiz 3
Spring Break			
M	M 14	5.1: Sequences	
W	M 16	5.2: Mathematical Induction I	
F	M 18	Portfolio Check Day	
M	M 21	5.3: Mathematical Induction II	Midterm Portfolio Due
W	M 23	5.4: Strong Mathematical Induction	
F	M 25	Induction Review	Quiz 4
M	M 28	5.6: Defining Sequences Recursively	
Sa	A 30	Final Portfolio due by noon	

W	M 30	5.7: Solving Recurrence Relations by Iteration	
F	A 1	6.1: Set Theory	
M	A 4	Recurrence Review	Quiz 5
W	A 6	6.2: Set Properties	
F	A 8	6.3: Set Proofs and Disproofs	
M	A 11	7.1: Functions	
W	A 13	7.2: One-to-One and Onto	
	Good Friday		
M	A 18	10.1: Graphs: Trails, Paths, and Circuits	
W	A 20	Set and Function Review	Quiz 5
F	A 22	10.4: Trees: Examples and Basics	
M	A 25	10.6: Spanning Trees	
Tu	A 26	Portfolio Check Day	