MATH 131, Spring 2025: Discrete Mathematics

Instructor

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Class Meetings

Mondays, Wednesdays, Fridays: 12:00 – 1:00 PM in Trexler 374

Expected Work Hours

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

Drop-in Hours

Mondays, Wednesdays, Fridays	9:30 AM – 10:15 AM
Tuesdays, Thursdays	10:00 AM – 11:00 AM

Other times available by appointment

Intended Learning Outcomes

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. By the end of this course, successful students will be able to produce mathematical proofs, understand the different types of proofs, and critique proofs on correctness. Successful students will also understand the basics of graph theory and recursion.

Required Materials

Textbook: *Discrete Mathematics with Applications*; Epp, 5th Edition
All work on homework, quizzes, and tests should be legible, neat and preferably in pencil.

Course Grades

The following table lists the weights for the various forms of assessment for this class.

Problem/Sets	20%
Quizzes	7%
Presentation	5%
Tests (14% each)	56%
Final Exam	12%

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		

Academic Integrity & AI

Students are expected to adhere to the Academic Integrity policies of Roanoke College. As in real life, failure to learn the rules is not an excuse. Please contact me if you have any questions. Be aware that I am contractually obligated to report students if I suspect that they have engaged in academic dishonesty. The use of laptops and other electronic devices during an exam is strictly prohibited. Any use of such devices during a quiz or exam will be considered a breach of Academic Integrity. Note that looking at or using your cell phone during a test or quiz is considered a violation of Academic Integrity regardless of your purpose or intent in doing so .

During in-class activities, it is fine – and even encouraged – to discuss and learn from one another. However, unless specifically stated otherwise, you are expected to individually complete all steps of the activity and to turn in your own work. All written assignments (unless specifically stated otherwise) are to be completed individually. Misrepresentation of your contribution to a group effort will be considered a violation of the Academic

Integrity policy. Copying and pasting directly from a web site and claiming it as your own work is the same as copying and pasting directly from a book – both are violations of the academic integrity policy and will be treated accordingly.

Since a central goal of this subject is to help you become independent and critical thinkers, you are discouraged from using AI tools to create your solutions and proofs for your assignments (problem sets, quizzes, responses, etc). Any work submitted using AI tools will be treated as though it was plagiarized.

If any part of this is confusing or uncertain, please reach out to me for a conversation before submitting your work.

Reading & Participation

The key to learning a topic in mathematics is participation. We will strive to have an active, rather than passive, classroom environment. The last page of the syllabus is a day by day outline of the sections that will be discussed in class. You are fully expected to have read the upcoming section **before** the class meeting!

Attendance & Make-Up Work

Attendance is critical to the understanding of the material in the course; it is both required and expected. Any absence that is not discussed with the instructor prior to the missed class is considered unexcused.

Test make-ups are administered in accordance with College policy. Anticipated, excused absences must be reported to the instructor with appropriate certification well before the scheduled test date. Legitimate emergency absences must be reported with appropriate documentation within one week of returning to class. No other make-ups will be given.

When absent, excused or unexcused, you are responsible for all material covered in class. You will not be allowed to make up any work missed due to an unexcused absence.

Problem Sets

A problem set will be due each week, usually on Wednesday (see the schedule on page 5). These will be assigned the previous week and each are worth a total of 25 points. There are two parts to your grade. The first part of each problem set is worth 20 points and will be graded based on correctness. Each week you will complete 5 problems, worth 4 points each, which will be carefully graded for correctness and completion of the solution. The second part of the problem set, worth 5 points, is for presentation of the problems.

For the first week we will have a two problems assigned on Monday and due Wednesday, to get you accustomed to the grading; this assignment will be worth 10 points.

Your homework must be neat and organized, with the problems listed in order, and will be turned it at the start of class. Preview any work before you submit it.

You can collaborate on problem sets but you must write up your own solution. If you are looking at another person's work when you are writing up your problem set, then you are in violation of the academic integrity policy of Roanoke College.

Late homework will only be accepted within 2 days of the original due date and will automatically lose the presentation points. At the end of the semester, your lowest Problem Set grade will be dropped.

Quizzes

There will be quizzes in this class every Friday we do not have a test. These will focus on definitions and short answer problems.

Quizzes cannot be made up. At the end of the semester, your lowest 2 Quiz grades will be dropped. Use these drops wisely - plan to come to class each day. If you are ill and miss class, then that will count as one of your drops.

Tests & Final Exam

Four tests will be given roughly every third week (see the schedule on page 3). Each test will focus on the material learned since the last test, but as with most mathematics classes, the exam will require you to understand and remember things from the past.

The final exam will be comprehensive and given during the scheduled time for the final exam for Block 4: Monday April 28, 2:00 – 5:00 PM. If your Final Exam grade is higher than your lowest test grade, then it will replace your lowest test grade.

Presentations

Each student will give an 8-minute presentation during the final week of classes. It will consist of material related to what we have seen in lectures but did not cover in depth. A list of available topics and further instructions will be available on Inquire after Spring Break.

MCSP Conversation Series

The MCSP Department offers a series of discussions that appeal to a broad range of interests related to these fields of study. These co-curricular sessions engage the community to think about ongoing research, novel applications and other issues that face our discipline.

Members of this class are invited be involved with all of these meetings; however participation in at least **two** of these sessions is mandatory. After attending, submit a one page paper reflecting on the discussion. This should not simply be a regurgitation of the content, but rather a personal contemplation of the experience. If you are caught leaving the talk early or being disruptive, you will receive a 0 on the assignment. For each missing reaction paper you will receive a 1 point deduction from your final course grade. Any additional reaction papers beyond the two required will add 0.5 points to your final course grade.

Classroom Etiquette

I consider this classroom to be a place where you will be treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records.

Subject Tutoring

Subject Tutoring, located on the lower level of Fintel Library (Room 5), is open 4 pm – 9 pm, Sunday – Thursday. Subject Tutors are highly trained, current students who offer free, one-on-one (and small group) tutorials in over 80 courses taught at Roanoke College, including: Business, Economics, Mathematics, INQ 240, Modern Languages, Lab Sciences, and Social Sciences. Check out all available subjects and schedule 30- or 60-minute appointments at `www.roanoke.edu/tutoring`. If you have a question, feel free to stop by or contact Subject Tutoring at `subject_tutoring@roanoke.edu` or 540-375-2590.

Accessible Education Services

(AES) is located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library. AES provides reasonable accommodations to students with documented disabilities. To register for services, students must self-identify to AES, complete the registration process, and provide current documentation of a disability along with recommendations from the qualified specialist. Please contact Dustin Persinger, Assistant Director of Academic Services for Accessible Education, at 540-375-2247 or by e-mail at `aes@roanoke.edu` to schedule an appointment. If you have registered with AES in the past and would like to receive academic accommodations for this semester, please contact Dustin Persinger at your earliest convenience to schedule an appointment and/or obtain your accommodation letter for the current semester.

Tentative Course Schedule

Date		Section	Topic	Items Due
Mon	Jan 13	1	Introduction & Speaking Mathematically	
Wed	Jan 15	1.4	The Language of Graphs	PS 1
Fri	Jan 17	2.1	Logical Forms and Equivalence	Quiz 1
Mon	Jan 20		**No Class** (Martin Luther King Day)	
Wed	Jan 22	2.2	Conditional Statements	PS2
Fri	Jan 24	2.3	Valid and Invalid Arguments	Quiz 2
Mon	Jan 27	3.1	Predicates and Quantified Statements I	
Wed	Jan 29	3.2	Predicates and Quantified Statements II	PS 3
Fri	Jan 31		**Test 1: Chapter 1 & 2**	
Mon	Feb 3	3.3	Statements Containing Multiple Quantifiers	
Wed	Feb 5	3.4	Arguments with Quantified Statements	PS 4
Fri	Feb 7	4.1	Direct Proof and Counterexample I: Intro	Quiz 3
Mon	Feb 10	4.2	Writing Advice	
Wed	Feb 12	4.3	Rational Numbers	PS 5
Fri	Feb 14	4.4	Divisibility	Quiz 4
Mon	Feb 17	4.5	Division into Cases	
Wed	Feb 19		Proof Review	PS 6
Fri	Feb 21		**Test 2: Chapter 3 & 4.1 – 4.5**	
Mon	Feb 24	4.7	Contradiction and Contraposition	
Wed	Feb 26	4.8	Classical Theorems	PS 7
Fri	Feb 28	4.9	Applications: The Handshake Theorem	Quiz 5
			Spring Break	
Mon	Mar 10	5.1	Sequences	
Wed	Mar 12	5.2	Mathematical Induction I	PS 8
Fri	Mar 14	5.3	Mathematical Induction II	Quiz 6
Mon	Mar 17	5.4	Strong Mathematical Induction	
Wed	Mar 19		Induction Review	PS 9
Fri	Mar 21	5.6	Defining Sequences Recursively	Quiz 7
Mon	Mar 24	5.7	Solving Recurrence Relations by Iteration	
Wed	Mar 26		Recurrence Review	PS 10
Fri	Mar 28		**Test 3: Sections 4.7 – 4.9 & 5.1 – 5.4**	
Mon	Mar 31	6.1	Set Theory	
Wed	Apr 2	6.2	Set Properties	PS 11
Fri	Apr 4	6.3	Set Proofs and Disproofs	Quiz 8
Mon	Apr 7	7.1	Functions	
Wed	Apr 9	7.2	One-to-One and Onto	PS 12
Fri	Apr 11	10.1-2	Graphs: Day 1	Quiz 9
Mon	Apr 14	10.4-6	Graphs: Day 2	
Wed	Apr 16		**Test 4: Sections 5.6 – 5.7, 6.1 – 6.3 & 7.1 – 7.2**	
Fri	Apr 18		**No Class** (Good Friday)	
Mon	Apr 21		Presentations	PS 13
Tue	Apr 22		Presentations	
Mon	Apr 28		**Final Exam: 2:00 PM - 5:00 PM**	