

MATH 131, Fall 2018: Discrete Mathematics

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CLASS MEETINGS Mondays, Wednesdays, Fridays: 12:00 – 1:00 PM in Miller 012

OFFICE HOURS By appointment only. See <https://saoub.youcanbook.me>

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*; Epp, Brief Edition
All work on homework, quizzes, and tests should be legible and done in pencil.

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

Problem Sets	27%
Daily Problems	8%
Quizzes	25%
Final Portfolio	40%

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	94-100	B	83-86	C	73-76	D	63-66	F	0-59
A-	90-93	B-	80-82	C-	70-72	D-	60-62		

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

ACADEMIC INTEGRITY Students are expected to adhere to the Academic Integrity policies of Roanoke College. All work submitted for a grade is to be your own work! No collaboration is allowed on quizzes or tests. Unless otherwise stated, you may work together on the homework, but should write up your solutions separately.

Cell phones must be turned off prior to entering the classroom. Laptops may be used for note-taking during regular class sessions, if this seems useful to you, but you may not log on to the internet or to an email server unless specifically told to do so. The use of laptops and other electronic devices during an exam is strictly prohibited. This includes tablets, smart phones, and iPods. 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.

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	<p>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. I will assume that if you accumulate 4 unexcused absences you are not interested in completing the course. After the 3rd unexcused absence, you, your advisor, and the registrar will be warned that another absence will result in your removal from the class (DF).</p> <p><i>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.</i></p>
PROBLEM SETS	<p>A problem set will be due each week, usually on Friday (see the schedule on page 4). These will be assigned the previous week and each are worth a total of 25 points. There are three parts to each problem set. The first part is worth 7 points and will be graded based on effort and completeness. This part consists of the daily homework assignments for the previous three class periods. Daily homework will include more computational type problems and you are welcome to ask questions about them at the beginning of class. The second part of each problem set is worth 16 points and will be graded based on correctness and presentation. Each week you will complete 4 problems, worth 4 points each, which will be carefully graded for correctness and completion of the solution. The third part of the problem set, worth 2 points, is for presentation of the problems.</p> <p>For the first week we will have a single problem assigned on Wednesday and due Friday, to get you accustomed to the grading; it will be worth 10 points.</p> <p>When you turn in your problem sets, make sure the four problems graded for correctness are on top and then below are your daily assignments. Your homework should be neat, organized, and stapled. 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.</p> <p>If you will be absent, turn in your homework before the class period it is due, or have a friend turn it in for you. Late homework will only be accepted within 2 days of the original due date and will automatically lose the completion points.</p>
QUIZZES	There will be quizzes at the start of class every other Wednesday. These problems will test your ability to reproduce material without your book or notes available.
DAILY PROBLEMS	Each day when you enter class (other than quiz days) there will be a problem on the board for you to complete. These problems will review recent topics and provide quick indication of your understanding of the material. The grade for the daily problems will be based on participation in the class discussion of the solution and periodically they will be collected and graded for correctness.
FINAL PORTFOLIO	In place of a final exam, you will prepare and turn in a Portfolio of Problems. You will be given a list of topics that must be included in the portfolio and guidance for choosing problems that fit those topics. There will be three Check-in Days throughout the semester for you to ask questions and maintain progress toward completing the portfolio. The problems you choose cannot be from those whose solution appear in the book or that have been previously graded.

The Final Portfolio will be due Friday December 14 at 3:30 PM, during the scheduled time for the final exam for Block 4.

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 to 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. This reaction paper will be counted as a quiz and should be uploaded to Inquire using the appropriate link. If you are caught leaving the talk early or being disruptive, you will receive a 0 on the assignment.

STUDY ROOM

The MCSP Study Room, Trexler 271, can be used by you and your friends to meet up so that you can work on homework together or prepare for tests. It is open virtually 24 hours a day, 7 days a week (very occasionally there are meetings in that room). Your student ID card should grant you access to Trexler Hall any time of day if the doors happen to be locked (use the card access point located by the first floor entrance facing the parking lot). Take advantage of this area and time, especially during weekdays when I am around (which is generally a lot)!

COMMUNITY

Please feel free to become an active member of our department's community. Each of the three disciplines in our department has a student club and you should join! The Roanoke College Student Chapter of the Mathematical Association of America (or "Math Club" for short) meets periodically, plays and learns about games and hosts evening events and the annual Pi-Day celebration! Membership in our Math Club also grants membership into the MAA itself; one of the premiere professional mathematical organizations in the world.

In addition, our department offers a weekly tea time for students and faculty; feel free to stop by the MCSP Study Lounge (Trexler 271) for tea and cookies on Thursdays from 2:15 PM to 3:15 PM. Come meet other students as well as chat with the MCSP faculty members in a casual setting!

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 Laura Leonard, 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 Laura Leonard at your earliest convenience to schedule an appointment.

TENTATIVE
COURSE
SCHEDULE

	Date	Section	Topic	Items Due
	Wed Aug 29	1	Introduction & Speaking Mathematically	
	Fri Aug 31	2.1	Logical Forms and Equivalence	PS 0
	Mon Sep 3	2.2	Conditional Statements	
	Wed Sep 5	2.3	Valid and Invalid Arguments	
	Fri Sep 7	3.1	Predicates and Quantified Statements I	PS 1
	Mon Sep 10	3.2	Predicates and Quantified Statements II	
	Wed Sep 12	3.3	Statements Containing Multiple Quantifiers	Quiz 1
	Fri Sep 14	3.4	Arguments with Quantified Statements	PS 2
	Mon Sep 17	4.1	Direct Proof and Counterexample	
	Wed Sep 19	4.1	Direct Proof and Counterexample	
	Fri Sep 21	4.2	Rational Numbers	PS 3
	Mon Sep 24	4.3	Divisibility	
	Wed Sep 26		Proof Practice Day 1	Quiz 2
	Fri Sep 28	4.4	Division into Cases	PS 4
	Mon Oct 1	4.5	Contradiction and Contraposition	
	Wed Oct 3	4.5	Contradiction and Contraposition	
	Fri Oct 5	4.6	Classical Theorems	PS 5
	Mon Oct 8		Proof Practice Day 2	Portfolio Check
	Wed Oct 10	5.1	Sequences	Quiz 3
	Fri Oct 12	5.2	Introduction to Induction	PS 6
Fall Break				
	Mon Oct 22	5.2	Mathematical Induction I	
	Wed Oct 24	5.3	Mathematical Induction II	
	Fri Oct 26	5.4	Strong Mathematical Induction	PS 7
	Mon Oct 29		Proof Practice Day 3	
	Wed Oct 31	5.5	Defining Sequences Recursively	Quiz 4
	Fri Nov 2	5.6	Solving Recurrence Relations by Iteration	PS 8
	Mon Nov 5	5.6	Solving Recurrence Relations by Iteration	
	Wed Nov 7		Proof Practice Day 4	Portfolio Check
	Fri Nov 9	6.1	Set Theory	PS9
	Mon Nov 12	6.2	Set Properties	
	Wed Nov 14	6.3	Set Proofs and Disproofs	Quiz 5
	Fri Nov 16	6.3	Set Proofs and Disproofs	PS 10
	Mon Nov 19		Proof Practice Day 5	
Thanksgiving Break				
	Mon Nov 26	7.1	Functions	
	Wed Nov 28	7.2	One-to-One and Onto	PS 11
	Fri Nov 30	10.1	Graphs: Definitions	
	Mon Dec 3	10.2	Paths Trails and Circuits	Quiz 6
	Wed Dec 5	10.3	Trees	PS 12
	Fri Dec 7		Review	Portfolio Check
	Fri Dec 14		Final Portfolio due by 3:30 PM	