

## MATH 131, Fall 2016: Discrete Mathematics

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Class Meetings Mondays, Wednesdays, Fridays: 12:00 – 1:00 PM in Trexler 374  
This course expects you to spend at least 12 hours of work each week inside and outside of class.

Office Hours Mondays 8:45 – 9:45 AM  
Tuesdays 11:00 AM – 12:00 PM  
Wednesdays 9:30 – 10:30 AM  
Thursdays 11:00 AM – 12:00 PM  
and by appointment (email 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.

Homework/Quizzes	20%
Presentation	5%
Tests (10% each)	60%
Final Exam	15%

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	

### 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.

Reading & Participation	<p>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 <b>before</b> the class meeting!</p>
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>
Homework	<p>Homework will be assigned regularly in this class (virtually every class period). Do not wait to start these until the night before the next class period! Most days some work will be collected and graded. The problems will serve as good examples on what is covered on tests. Three problems will be graded for correctness (for 6 points total), and the remainder will be graded for completion (for 4 additional points). You may discuss the homework with classmates, but all write-ups should be done separately.</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	<p>There will be quizzes in this class every other Wednesday. They may either be in-class quizzes or take-home quizzes. These will focus on definitions and short answers problems.</p>
Tests & Final Exam	<p>Six tests will be given roughly every sixth day (see the schedule on page 4). 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.</p> <p><b>The final exam will be comprehensive and given during the scheduled time for the final exam for Block 4: December 16, 2:00 – 5:00 PM.</b></p>
Presentations	<p>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 Fall Break.</p>
MCSP Conversation Series	<p>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.</p> <p>Members of this class are invited to be involved with all of these meetings; however participation in at least <b>two</b> 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.</p>

**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 every other week, 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 2:30 PM to 3:30 PM. Come meet other students as well as chat with the MCSP faculty members in a casual setting!

Tentative  
Course  
Schedule

	Date	Section	Topic
	Wed Aug 31	1	Introduction & Speaking Mathematically
	Fri Sep 2	2.1	Logical Forms and Equivalence
	Mon Sep 5	2.2	Conditional Statements
	Wed Sep 7	2.3	Valid and Invalid Arguments
	Fri Sep 9	3.1	Predicates and Quantified Statements I
	Mon Sep 12	3.2	Predicates and Quantified Statements II
	Wed Sep 14		<b>Test 1</b>
	Fri Sep 16	3.3	Statements Containing Multiple Quantifiers
	Mon Sep 19	3.4	Arguments with Quantified Statements
	Wed Sep 21	10	Graphs: An Introduction
	Fri Sep 23	4.1	Direct Proof and Counterexample I: Introduction
	Mon Sep 26	4.1	Direct Proof and Counterexample I: Introduction
	Wed Sep 28		<b>Test 2</b>
	Fri Sep 30	4.2	Direct Proof and Counterexample II: Rational Numbers
	Mon Oct 3	4.3	Direct Proof and Counterexample III: Divisibility
	Wed Oct 5	4.4	Direct Proof and Counterexample IV: Division into Cases
	Fri Oct 7	10	Graph Theory Arguments
	Mon Oct 10	4.5	Indirect Arguments: Contradiction and Contraposition
	Wed Oct 12		<b>Test 3</b>
	Fri Oct 14		Additional Proof Practice
<b>Fall Break</b>			
	Mon Oct 24	4.6	Classical Theorems
	Wed Oct 26	10	Graph Theory Proofs
	Fri Oct 28	5.1	Sequences
	Mon Oct 31	5.2	Mathematical Induction I
	Wed Nov 2		<b>Test 4</b>
	Fri Nov 4		<b>No Class</b>
	Mon Nov 7	5.3	Mathematical Induction II
	Wed Nov 9	5.4	Strong Mathematical Induction
	Fri Nov 11	5.5	Defining Sequences Recursively
	Mon Nov 14	5.6	Solving Recurrence Relations by Iteration
	Wed Nov 16		<b>Test 5</b>
	Fri Nov 18	6.1	Set Theory
	Mon Nov 21	6.2	Set Properties
<b>Thanksgiving Break</b>			
	Mon Nov 28	6.3	Set Proofs and Disproofs
	Wed Nov 30	10	More Graphs
	Fri Dec 2		<b>Test 6</b>
	Mon Dec 5		Presentations
	Wed Dec 7		Presentations
	Fri Dec 9		<b>Review for Final</b>
	<b>Fri Dec 16</b>		<b>Final Exam: 2:00 PM - 5:00 PM</b>