MATH 131, Fall 2019: Discrete Mathematics

Instructor	Dr. Karin Saoub	*Phone:* (540) 375-2348
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Class Meetings

Mondays, Wednesdays, Fridays: 1:10 – 2:10 PM in Miller 113

Office Hours

By appointment only, mainly during the times listed below. See https://saoub.youcanbook.me

Mondays, Wednesdays	12:00 – 1:00 PM
Wednesdays, Fridays	9:00 – 9:30 AM
Thursdays	1:00 – 2:00 PM

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 or typed.

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 many 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

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).

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 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. 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.

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.

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.

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.

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 Thursday December 12 at 9 AM.

Co-Curricular Engagement

The MCSP Department offers a series of talks (MCSP Conversation Series) 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 one of these sessions is mandatory. After attending, submit a one page paper reflecting on the discussion through Inquire. This should not simply be a regurgitation of the content, but rather a personal contemplation of the experience. Additional participation (and submission of a reflection paper) earn extra credit, with .5% added to your course average for each attended, up to 2% total. In addition, individually you may request that other appropriate events count.

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.

Date		Section	Topic	Items Due
Wed	Aug 28	1	Introduction & Speaking Mathematically	
Fri	Aug 30	2.1	Logical Forms and Equivalence	PS 0
Mon	Sep 2	2.2	Conditional Statements	
Wed	Sep 4	2.3	Valid and Invalid Arguments	
Fri	Sep 6	3.1	Predicates and Quantified Statements I	PS 1
Mon	Sep 9	3.2	Predicates and Quantified Statements II	
Wed	Sep 11	3.3	Statements Containing Multiple Quantifiers	Quiz 1
Fri	Sep 13	3.4	Arguments with Quantified Statements	PS 2
Mon	Sep 16	4.1	Direct Proof and Counterexample	
Wed	Sep 18	4.1	Direct Proof and Counterexample	
Fri	Sep 20	4.2	Rational Numbers	PS 3
Mon	Sep 23	4.3	Divisibility	
Wed	Sep 25		Proof Practice Day 1	Quiz 2
Fri	Sep 27	4.4	Division into Cases	PS 4
Mon	Sep 30	4.5	Contradiction and Contraposition	
Wed	Oct 2	4.5	Contradiction and Contraposition	
Fri	Oct 4	4.6	Classical Theorems	PS 5
Mon	Oct 7		Proof Practice Day 2	Portfolio Check
Wed	Oct 9	5.1	Sequences	Quiz 3
Fri	Oct 11	5.2	Introduction to Induction	PS 6
			Fall Break	
Mon	Oct 21	5.2	Mathematical Induction I	
Wed	Oct 23	5.3	Mathematical Induction II	
Fri	Oct 25	5.4	Strong Mathematical Induction	PS 7
Mon	Oct 28		Proof Practice Day 3	
Wed	Oct 30	5.5	Defining Sequences Recursively	Quiz 4
Fri	Nov 1	5.6	Solving Recurrence Relations by Iteration	PS 8
Mon	Nov 4	5.6	Solving Recurrence Relations by Iteration	
Wed	Nov 6	6.1	Set Theory	
Fri	Nov 8		Proof Practice Day 4	Portfolio Check & PS9
Mon	Nov 11	6.2	Set Properties	
Wed	Nov 13	6.3	Set Proofs and Disproofs	Quiz 5
Fri	Nov 15	6.3	Set Proofs and Disproofs	PS 10
Mon	Nov 18		Proof Practice Day 5	
Wed	Nov 20	7.1	Functions	
Fri	Nov 22	7.2	One-to-One and Onto	PS 11
Mon	Nov 25	10.1	Graphs: Definitions	
			Thanksgiving Break	

Tentative Course Schedule

Mon	Dec 2	10.2	Paths Trails and Circuits	Quiz 6
Wed	Dec 4	10.3	Trees	PS 12
Fri	Dec 6		Review	Portfolio Check
Thu	Dec 12		**Final Portfolio due by 9 AM**	