

MATH 131 A: Discrete Mathematics
Fall 2024, MWF 12:00 - 1:00, Trexler Hall 374

Instructor: Dr. Michael Weselcouch

Office: Trex #270F

Student Hours: Tu 11:00-12:00, Th 1:30-2:30, or by appointment.

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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 this course, successful students will be able to:

- produce mathematical proofs
- understand the different types of proofs
- critique proofs on the correctness
- understand the basics of graph theory and recursion

Course Materials.

- (1) *Textbook: Discrete Mathematics with Applications* Epp, 5th Edition
- (2) *Devices:* access to a computer

Attendance Policy. Class attendance is a very important aspect of a student's success in this course. The student is expected to attend every class and is accountable for missed content and assignments.

Structure and Grading. 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.

Grading Scale

	93-100	A	90-92.99	A-	
87-89.99	B+	83-86.99	B	80-82.99	B-
77-79.99	C+	73-76.99	C	70-72.99	C-
67-69.99	D+	63-66.99	D	60-62.99	D-

The final course grade is determined in the following way:

Homework 25%
Quizzes 30%

Midterm Portfolio 15%
Final Portfolio 30%

Homework. I will assign a graded homework problem each day. The homework you turn in should be a neat and organized final draft of your work, not a rough draft. Submit your homework in class OR via Inquire as a PDF or Word file. (Picture files may not allow me to give you comments, so copy/paste pictures into Word or get a PDF scanner app on your phone.) These problems are due at the beginning of the next class so you can ask questions about them before we start new material. Since I can't accept homework turned in after we've discussed it in class, late homework will usually not be accepted. If you are unable to complete the homework on time for some reason, please contact me about that as soon as you can so we figure out how to handle the situation. 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.

Quizzes. We will have six quizzes throughout the term. Each quiz will focus on the material learned since the last quiz, but may contain or refer to previous material.

Quiz Make-up Policy. Quiz 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.

Corrections to Grading. If you think an error may have been made in the grading of your test, carefully review the answer key posted on Inquire and then contact the instructor **within 1 week of the test's return** with your question. **Do NOT alter the original work.** The entire test may be re-graded and the test grade is *subject to remain the same, increase or decrease* at the discretion of the instructor.

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 18. The Final Portfolio will cover the rest of the course and will be due on Thursday April 25. You should definitely be working on these portfolios throughout the semester! I am happy to talk about your portfolio with you, but you may not discuss it with anyone else except during our two “portfolio check days” where you can consult with your classmates on your write-ups.

MCSP Conversations. The MCSP department offers a series of talks designed to appeal to a broad audience. Members of this class are encouraged to attend many of these meetings, however attending at least one session is mandatory. The schedule for the talks is posted on Inquire. Within one week of attendance you must submit a response to the talk. This will count towards your Homework grade.

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

Electronic Devices. You can use only your calculator during class unless stated otherwise. (This means no cell phones - please set them on silent and leave them in your bag.)

Inquire Policy. Students are required to be knowledgeable of all postings on Inquire. It is each student's responsibility to consistently monitor Inquire for course information. This means every day! Any assignment that requires an Inquire upload will not be accepted in any other form. Also, to receive credit for uploads, the file must be readable on the instructor's college computer. It is the student's responsibility to make successful submissions. It is the student's responsibility to resolve technology problems through the college's IT department.

Academic Integrity. I expect all of you to follow the Academic Integrity policies of Roanoke College. All work submitted for a grade must be your own (for instance, you cannot use internet resources aside from my own YouTube videos or other videos linked on Inquire and, if you do work and study with others, the final write-up must be done by yourself). If you ever have questions about how these policies apply to our class please contact me. Any violations of our AI policies will automatically be turned over to the Academic Integrity Council.

Subject Tutoring. Subject Tutoring, located on the lower level of Fintel Library (Room 5), is open 4 pm – 9 pm, Sunday – Thursday. We are a Level II Internationally Certified Training Center through the College Reading and Learning Association (CRLA). Subject Tutors are friendly, highly-trained Roanoke College students who offer free, one-on-one tutorials in a variety of general education and major courses such as: Business, Economics, Mathematics, INQ 240, Modern Languages, Lab Sciences, INQ 250, and Social Sciences (see all available subjects at www.roanoke.edu/tutoring). Tutoring sessions are available in 30 or 60-minute appointments. Schedule an appointment at www.roanoke.edu/tutoring, or contact us at (540)375-2590 or subject_tutoring@roanoke.edu. We hope to see you soon!

AES. 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. To schedule an appointment, call (540)375-2247 or e-mail aes@roanoke.edu. If you have registered with AES in the past and would like to receive academic accommodations for this semester, please contact the AES at your earliest convenience to schedule an appointment and/or obtain your accommodation letter for the current semester.

Course Schedule

Date	Section	Topic
Wed Aug 28	1.1-1.3	Variables, Sets, Functions
Fri Aug 30	1.4	The Language of Graphs
Mon Sep 2	2.1	Logical Form and Logical Equivalence
Wed Sep 4	2.2	Conditional Statements
Fri Sep 6	2.3	Valid and Invalid Arguments
Mon Sep 9		Quiz 1
Wed Sep 11	3.1	Predicates and Quantified Statements I
Fri Sep 13	3.2	Predicates and Quantified Statements II
Mon Sep 16	3.3	Statements with Multiple Quantifiers
Wed Sep 18	3.4	Arguments with Quantified Statements
Fri Sep 20	4.1	Direct Proof and Counterexample I: Introduction
Mon Sep 23		Quiz 2
Wed Sep 25	4.2	Writing Advice
Fri Sep 27	4.3	Rational Numbers
Mon Sep 30	4.4	Divisibility
Wed Oct 2	4.5	Proof by Cases
Fri Oct 4	4.7	Indirect Argument: Contradiction and Contraposition
Mon Oct 7	4.8	Indirect Argument: Two Famous Theorems
Wed Oct 9	4.9	Application: The Handshake Theorem
Fri Oct 11		Quiz 3
		Fall Break
Mon Oct 21	5.1	Sequences
Wed Oct 23	5.2	Mathematical Induction I: Proving Formulas
Fri Oct 25		Portfolio Check Day
Mon Oct 28	5.3	Mathematical Induction II: Applications
Wed Oct 30		Induction Worksheet
Fri Nov 1		Quiz 4
Mon Nov 4	5.6	Defining Sequences Recursively
Wed Nov 6	5.7	Solving Recurrence Relations by Iteration
Fri Nov 8		Quiz 5
Mon Nov 11	6.1	Set Theory
Wed Nov 13	6.2	Properties of Sets
Fri Nov 15	6.3	Disproofs and Algebraic Proofs
Mon Nov 18	7.1	Functions Defined on General Sets
Wed Nov 20	7.2	One-to-one, Onto, and Inverse Functions
Fri Nov 22		Quiz 6
Mon Nov 25	10.1	Trails, Paths, and Circuits
Mon Dec 2	10.2	Matrix Representations of Graphs
Wed Dec 4	10.4	Trees: Examples and Basic Properties
Fri Dec 6		Portfolio Check Day