

## MATH 111, Fall 2024: Math Models for Management Science

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INSTRUCTOR	Dr. Karin Saoub Trexler Hall 270C	<i>Phone:</i> (540) 375-2348 <i>Email:</i> saoub@roanoke.edu
CLASS MEETINGS	Tuesdays, Thursdays: 1:10 - 2:40 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.	
OFFICE HOURS	Drop-in times are Tuesdays and Wednesdays 10:30–11:30am. Other times are available by appointment and can be conducted in person or on Zoom. See inquire for the booking link for appointments.	
ABOUT THE COURSE	The objective of this course is to provide the background in the quantitative techniques necessary to better understand advanced courses in Business and Economics.	
INTENDED LEARNING OUTCOMES	By the end of this course, successful students will be able to: <ul style="list-style-type: none"><li>• Solve linear equations in one or more variables</li><li>• Solve applied problems using linear equations</li><li>• Solve systems of linear equations using graphing, substitution, elimination, or matrix methods</li><li>• Solve quadratic functions and use them in applications</li><li>• Solve systems of linear inequalities in two variables</li><li>• Use graphical methods to solve linear programming problems</li><li>• Find the derivatives of functions</li><li>• Use derivatives in business applications</li></ul>	
REQUIRED MATERIALS	<ul style="list-style-type: none"><li>• Textbook: <i>Mathematical Applications for the Management, Life, and Social Sciences</i>, (12th edition), by Ronald Harshbarger and James J. Reynolds.</li><li>• Calculator: A scientific or graphing calculator is recommended but not required.</li><li>• MyOpenMath: Homework will be posted here.</li></ul>	
COURSE GRADES	The following table lists the weights for the various forms of assessment for this class.	

Homework	20%
Problem of the Day	16%
<b>Mastery Test</b>	<b>64%</b>

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

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. 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.

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.*

PARTICIPATION

We will strive to have an active, rather than passive, classroom environment. Failure to attend required classes or be an active participant in class discussions will result in a lowering of your final grade by up to 10 points.

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](http://www.roanoke.edu/tutoring). If you have a question, feel free to stop by or contact Subject Tutoring at [subject\\_tutoring@roanoke.edu](mailto: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](mailto: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.

#### HOMEWORK

Homework problems will be assigned through MyOpenMath after nearly every lecture. You will have 48 hours to complete these assignments. All work submitted for a grade must be your own (for instance, you cannot use internet resources aside from videos linked on Inquire and, if you do work and study with others, the final write-up must be done by yourself). You will be granted 5 late passes at the beginning of the semester. You may apply these to any of the online assignments for an automatic 24 hour extension with no late penalty. Note that if you try to use a late pass on an assignment due say 14 days prior, you will not be able to as you would need an extension of over 14 days. You therefore need to keep up with the online homework.

#### PROBLEM OF THE DAY

At the start of each class, there will be a single page of three or fewer problems for you to complete. These will be closely related to the topic from the previous class and the online homework. You will be able to use your notes and book when completing the worksheet. It is expected that these will not take more than 5 minutes. These will be graded and returned by the next class period, providing feedback for you to use in your preparation for a mastery test.

These problems cannot be made up. At the end of the semester, your lowest 3 grades for the Problem of the Day will be dropped. Use these drops wisely - plan to come to class each day ready to complete a worksheet. If you are ill and miss class, then that will count as one of your drops.

#### MASTERY TESTS

We will use Mastery-Based Testing rather than Points-Based Testing. Mastery-based testing is very different from what you are used to – do not hesitate to ask me questions! You will only receive credit for answers that demonstrate you completely understand (have mastered) a topic. But you will get MANY chances to display mastery throughout the semester with NO PENALTY for earlier attempts. You may not work with anyone on your Mastery Tests.

- The course has been summarized by 16 topics.
- Your mastery of questions on these topics is assessed through the working of problems in mastery opportunity classes and during the final exam period.
- Each problem submitted is graded as either “Mastered” or “Not Mastered”. A grade of Mastery indicates that you have demonstrated a full understanding of the concept being tested and further work on the topic is unnecessary.
- Once you have mastered a topic, you need not attempt it again.
- There is no penalty for multiple attempts taken to achieve mastery.
- Mastery does not mean perfect! It means you understand and can demonstrate all fundamentals of the topic and are proficient at the level desired for the course you do not need to study the topic further.
- All students are required to attempt to master topics for the first time in class on the date listed in the course schedule.
- Retrying to master the topics may be done on subsequent Mastery Test days after the first in-class opportunity.
- Your overall test grade is determined by the number of topics you have mastered, as illustrated in the table below:

Mastered	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Grade	64	60	56	52	48	44	40	36	32	28	24	20	16	12	8	4

MASTERY  
TOPICS

Topic	Section	Description
1	§7.5	Permutations and Combinations
2	§1.1	Linear Equations in One Variable
3	§1.2	Functions
4	§1.3	Linear Functions
5	§1.5	Systems of Linear Equations
6	§1.6	Applications of Functions
7	§3.1 – 3.2	Matrices
8	§3.3 – 3.4	Matrix Equations
9	§4.1 – 4.2	Linear Programming
10	§2.1	Solving Quadratic Equations
11	§2.2	Parabolas
12	§2.3	Applications of Quadratic Equations
13	§2.5	Curve Fitting
14	§9.1 – 9.2	Limits
15	§9.3 – 9.9	Derivative Rules
16	§10.1 – 10.2	Curve Sketching

MCSP  
CONVERSATION  
SERIES

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 to be involved with all of these meetings. 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. These reflection papers 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.

TENTATIVE  
COURSE  
SCHEDULE

The schedule below is tentative and subject to change. It should give you an idea of the timing of the topics covered and Mastery Test Days. Homework due dates will appear on Inquire.

	Date		Section	Topic	Mastery Topic
1	Thu	Aug 29	7.5	Counting: Permutations and Combinations	
2	Tue	Sept 3	1.1	Solutions of Linear Equations and Inequalities	
	Thu	Sept 5	1.2	Functions	(1), (2)
3	Tue	Sept 10	1.3	Linear Functions	
	Thu	Sept 12	1.5	Solutions of Systems of Linear Equations	
4	Tue	Sept 17	1.6, 3.1	Applications of Functions; Matrices	
	Thu	Sept 19	3.2	Matrix Multiplication	(3) - (6)
5	Tue	Sept 24	3.4	Inverse Matrices	
	Thu	Sept 26	3.3	Matrices and Solving Systems of Equations	
6	Tue	Oct 1	4.1	Linear Inequalities in Two Variables	
	Thu	Oct 3	4.2	Linear Programming: Graphical Methods	(7), (8)
7	Tue	Oct 8	2.1, 2.2	Quadratic Equations and Parabolas	
	Thu	Oct 10		Mastery Day	(1) - (11)
<b>Fall Break</b>					
8	Tue	Oct 22	2.3, 2.5	Business Applications Using Quadratics and Data	
	Thu	Oct 24	9.1	Limits	
9	Tue	Oct 29	9.2	Continuous Functions and Limits with Infinity	
	Thu	Oct 31	9.3	Rates of Change	(12), (13)
10	Tue	Nov 5	9.3	Rates of Change and Derivatives	
	Thu	Nov 7	9.4	Derivative Formulas	(14)
11	Tue	Nov 12	9.5, 9.6	Product, Quotient, Chain Rules	
	Thu	Nov 14	9.8	Higher-Order Derivatives	
12	Tue	Nov 19	9.9	Applications: Marginals and Derivatives	
	Thu	Nov 21	10.1	Relative Maxima and Minima	(15)
13	Tue	Nov 26	10.1	Curve Sketching	
	Thu	Nov 28		<b>Thanksgiving Break</b>	
14	Tue	Dec 3	10.2	Concavity; Points of Inflection	
	Thu	Dec 5	10.2	Concavity	(16)
<b>F</b>	<b>Mon</b>	<b>Dec 9</b>		<b>Final Exam 2–5 PM</b>	<b>(1) - (16)</b>