MATH 111: Math Models for the Management Science
Spring 2025

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Course Objective. The objective of this course is to provide the background in the quantitative techniques necessary to better understand advanced courses in Business and Economics.

Note. This course may not be taken for credit if credit has been received for Mathematics 112 or higher. If you have questions concerning this, please contact your advisor immediately. Also, you need to earn a C or better in this course or in INQ 240 to declare a major in Business Administration. Once again, please contact your advisor if you have questions regarding the necessary grades/courses.

Attendance Policy. Attendance is a very important aspect of a student's success in this course. For that reason it makes up part of your grade. It will be taken at the beginning of every class meeting. If you arrive late, it is your responsibility to make sure you are not marked absent in my grade book. You get three free absences so that I don't have to distinguish between excused and unexcused absences. Please come see me immediately if you are an athlete or if you are involved with other activities on campus that will require you to miss class. If you should have an emergency that requires you to miss a large chunk of the course, please notify me ASAP.

Learning Outcomes. By the end of this course, successful students will be able to:

- Solve linear equations in one or more variables
- Solve applied problems using linear equations
- Solve systems of linear equations using graphing, substitution, elimination, or matrix methods
- Solve quadratic functions and use them in applications
- Solve systems of linear inequalities in two variables
- Use graphical methods to solve linear programming problems
- Find the derivatives of functions
- Use derivatives in business applications

Course Materials.

(1) *Textbook:Mathematical Applications for the Management, Life, and Social Sciences*, (11th edition), by Ronald Harshbarger and James J. Reynolds.
(2) *Calculator:* A scientific or graphing calculator is recommended but not required.
(3) *YouTube:* The lecture videos are posted on this YouTube playlist as well as Inquire.
(4) *MyOpenMath:* In-Class Work/Homework will be posted here.

Structure. This course will follow a flipped classroom approach. Before each class, you will watch recorded lectures to learn new concepts at your own pace. During class, we will focus on applying these ideas through group work, collaborative problem-solving, and discussions. This structure is designed to deepen your understanding and provide more opportunities for peer interaction and instant feedback from me.

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:

Mastery Test	60%
In-Class Work/Homework	30%
Attendance	10%

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 (see end of syllabus).
- Your mastery of questions on these topics is assessed through the working of problems in mastery opportunity classes and during the final exam period.
- You will have two in-class attempts at each topic. You can schedule an addition two attempts outside of class hours in my office or during a Mastery Test day. If you are planning to use one of your additional attempts in class, you need to let me know 24 hours in advance.
- 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.

In-Class Work/Homework. There will be one assignment after nearly every lecture. You will start it during class in small groups and whatever you don't finish is homework. These assignments are on our class's MyOpenMath page. 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) however **a tutor can help you on these assignments**. 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.

Test Make-up Policy. 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.

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

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. (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 a PDF and 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 graded work should be your own work! This means that you cannot use any websites or apps that give step-by-step solutions to the problems. No collaboration is allowed on Mastery Tests. Unless otherwise stated, you many work together or with a Roanoke College tutor on the homework, but should write up your solutions separately. 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.

Accommodations. If you may require an accommodation in this course, please provide me with your documentation within the first 2 weeks of the semester. I must have your documentation at least 48 hours prior to any accommodation made. (Check with the Center for Learning and Teaching for their scheduling guidelines.)

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!

Writing Center. The Writing Center @ Roanoke College offers tutorials focused on writing projects and oral presentations for students working in any field. Writers and presenters at all levels of experience may consult the Writing Center at any point in their process—including brainstorming, drafting, organizing, editing, or polishing presentation skills—to talk with trained peer tutors in informal, one-on-one sessions. Schedule an appointment at www.roanoke.edu/writingcenter, where our staff members and workshops are also posted. Questions? Email writingcenter@roanoke.edu.

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.

Mastery Topics

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

Course Schedule

Week	Lecture Material	Assignments
1	Section 1.1, 1.2	
2	Section 1.3, 1.5	
3	Section 1.6	Mastery 1-5 Friday
4	Section 3.1, 3.2, 3.4	
5	Section 3.3	Mastery 6-7 Friday
6	Section 4.1, 4.2, 2.1	
7	Section 2.2, 2.3	Mastery 8-10 Friday
8	Spring Break	
9	Section 2.5, 7.5	Mastery 11-12 Friday
10	Section 9.1, 9.2	Mastery 13 Friday
11	Section 9.3, 9.4	
12	Section 9.5, 9.6, 9.7 9.8	
13	Section 9.9	Mastery 14-15 Friday
14	Section 10.1, 10.2	
15		Mastery 16 Tuesday
4/24	8:30 - 11:30 (9:40 class)	Final Mastery Attempts
4/29	2:00 - 5:00 (8:30 class)	Final Mastery Attempts