MATH 111 Mathematical Models for the Management Sciences
Spring 2020

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Office Hours: Monday 4:00 to 6:00 pm, Wednesday 12:00 to 2:00 pm, Wednesday 4:00 to 5:00pm
and Friday 7:00 to 9:00 am <u>OR</u> 10:00 to Noon
All office hours are by appointment. To make an appointment, please use the link:
https://rreakes24.youcanbook.me
You may only book 1 appointment per day!
If these hours do not work with your schedule, please call or email me to set up an appointment.

Text: *Mathematical Applications for the Management, Life, and Social Sciences, (10th edition),*
by Ronald Harshbarger and James J. Reynolds.

Required Materials: The use of a laptop during class will be very helpful, but a smartphone could be used.

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.

Academic Integrity: You are expected to be familiar with the Academic Integrity Code outlined in the booklet, *Academic Integrity at Roanoke College.*
https://www.roanoke.edu/inside/a-z_index/academic_affairs/academic_integrity.
You are expected to do all work graded for accuracy independently. This includes tests, quizzes, and graded practice problems. You are allowed to work alone, with a partner or a group on the daily independent practice problems which will only be checked for completion.

Course Objective: to provide the background in the quantitative techniques necessary to better understand more advanced courses in Business and Economics.

Course Outcomes: Upon completing this course, the student should be able to:
1)   solve linear equations (and applications) in one or more variables.
2)   solve systems of linear equations (and applications) by utilizing graphing, elimination, and matrix row-reduction techniques.
3)   solve quadratic functions and to utilize these functions in applications.
4)   utilize both graphical methods and Excel Solver to find the optimal value of a linear function, subject to constraints.
5)   Select a best fit line or curve function for a data set and find the regression equation.
6)   find the derivative of a function, interpret the derivative, and use the derivative for business applications.

Policy on expected number of hours of work per week: Per the Academic Catalog, "For each one-unit course, students are expected to complete 12 hours of work inside and outside of class each week." Realistically, this may vary due to the strength of the background of each individual student with respect to course content.

Grading:

Completion of Watching Videos	5%
Completion of Independent Practice Problems:	10%
Graded Practice Accuracy Quizzes::	15%
Mastery Test Grade:	70%

Grades will be assigned using the scale below:

A	93-100		C	73-76
A-	90-92		C-	70-72
B+	87-89		D+	67-69
B	83-86		D	63-66
B-	80-82		D-	60-62
C+	77-79		F	Below 60

Testing Policy: 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.

- 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.
- Your overall test grade is determined by the number of topics you have mastered illustrated in the table below:

# Mastered	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Mastery Grade	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25

- 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 after the first attempt may be done any time after the first attempt either in class on mastery opportunity days or during office hours.
  - To retry a topic in class you will request which topics you want to attempt to master using a Google Form link sent to you via email or use the link in Inquire. This request must be submitted by NOON the day prior to the mastery opportunity class.
  - To retry a topic during office hours, you must book an appointment during office hours. If my posted office hours do not work with your schedule, you may email me to set up a time that works for both of us.

Late Work Policy: Independent practice problems will be checked in class for competition the day they are due. This work will only be accepted on the day it is due. No late papers will be accepted without arrangements approved prior to absence OR without written documentation from a college official. If you miss class for any reason you should email the assignment to me the day it is due!

Accuracy Quizzes will be administered every day that graded practice is due. A student can make up the quiz if it was missed due to an excused absence by making an office appointment before the next class.

Attendance: 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. An email notifying the instructor prior to class with a picture of the independent practice attached which is due that day is required prior to class. I will assume that if you accumulate 3 unexcused absences you are not interested in completing the course and will drop you from the class with a grade of DF (dropped-failing) recorded, regardless of your current average in the course. You, your advisor, and the registrar will receive a warning email at your second unexcused absence. When absent, excused or unexcused, you are responsible for all material covered in class. Work missed due to either an unexcused or excused absence can only be made up when arrangements are made in advance of the absence.

Subject Tutoring: Subject Tutoring is a CRLA Nationally Certified Program located on the lower level of Fintel Library in room 005. Subject Tutoring offers individual appointments in 30-minute intervals for Lab Sciences, Modern Languages, Math and CPSC, Social Sciences, Business and Economics. Hours are Sunday - Thursday 4 p.m. - 9 p.m. For a list of tutorials or to make an appointment, go to www.roanoke.edu/tutoring.

Tentative Schedule and Assignments:
Use the following link:
Course Schedule

Topics:
Use the following link:
Course Topics

9/11	Date	Topic	Textbook Sections	Topic	Independent Practice
Mon	1/13			Course Introduction	Personal Introduction Email
				Desmos Share Activity	
Wed	1/15	1	7.5	Permutations, Combinations	pp470-471/ 1,15,27,31,41,43
Mon	1/20	2	1.2	Functions	pp73-74/ 1,3,4,5,6,13
			1.6	Business Applications of Functions	pp112-113/ 1,9,13
			2.5	Piecewise Functions	pp163-164/ 49
Wed	1/22	3	1.1	Solving Linear Equations in One Variable	p62/ 9,13,19,31 Graphically & Algebraically
			1.6	Business Applications of Linear Equations	pp113-114/ 3,17,19 Graphically & Algebraically
			1.1	Solving Linear Inequalities in One Variable	
Mon	1/27	4	1.3	Writing Linear functions , Graphing lines	pp85-87/ 9,10,13,17,19,21,23,29,35,37,64 Confirm Algebra Answers Graphically
			1.6	Business Applications of Linear Functions	pp112-113/ 5,7 Confirm Algebra Answers Graphically
Wed	1/29	5	2.5	Scatter Plots, Correlation & Linear Regression	pp171-172/ 9,10,25,26
				Required Mastery Opportunity for Topics 1-4	
Mon	2/3	6	1.5	Solutions of systems of linear equations Graphically & Algebraically	p104/ 9,10,13,19,23
			1.6	Business Applications of Systems of Equations	p115/ 45,47 Graphically & Algebraically
Wed	2/5	7	2.5	Scatter Plots, Correlation & Quadratic Regression	pp171-172/ 11,12,28a,31a
				Excel Class Activity Graded Practice	
Mon	2/10	8	2.2	Quadratic Functions: Graphing & Properties of Parabolas	pp143-145/ 3,5,31,33 Confirm Algebra Answers Graphically
			2.3	Business Applications of Graphs & Properties of Quadratic Functions	pp151-152/ 7,9,11 Confirm Algebra Answers Graphically
Wed	2/12	9	2.1	Solving Quadratic Equations	p134/ 5,7,11,13b,15b,25,41 Graphically & Algebraically
		9	2.3	Business Applications of Solving Quadratic Equations	p134/ 45,47; pp151-152/ 3,5 Graphically & Algebraically
				Required Mastery Opportunity for Topics 5-8	
				Mastery Redo Opportunity for Topics 1-4	
Mon	2/17	10	2.3	Business Applications of Quadratic Systems	pp152-153/ 23,25,27,29,31 Graphically & Algebraically
Wed	2/19	11	2.4	Polynomial, Rational, Power, & Exponential Functions	pp162-164/ 13,43 p336/ 29 (Graph them also!)

			2.5	Using Correlation to Find and graph the Best Fit Curve pp171-173/ 1-8 all, 32-35 all
Mon	2/24	12.1	1.5	Solving 3 by 3 Systems Algebraically p104/ 31,33,34 p236/ 57a p252/ 56a Graphically & Algebraically
Wed	2/26	12.2	3.1	Matrices p194/ 15,17,19,25,27
			3.2	Multiplication of Matrices pp206-207/ 3-13 odd
			3.4	Inverses of Matices p234/ 5,7,15,17
				Required Mastery Opportunity for Topics 9-11
				Mastery Redo Opportunity for Topics 1-8
Mon	3/2			Spring Break
Wed	3/4			Spring Break
Mon	3/9	12.3	3.4	Using Matrix Matrix Equation to Solve Linear System p104/ 31,33,34 p236/ 57a p252/ 56a
			3.3	Using Gauss Jordan Elimination (Rref on TI83/84) Solve all questions using a matrix equation

AND an augmented matix.

Wed	3/11	13.1	4.2	Linear Programming: Graphical Methods pp275-277/ 1,3,15,17 25,27
Mon	3/16	13.2	4.3	Linear Programming: Using Excel Shared Excel File IP1, IP2, IP3, IP4
Wed	3/18			Required Mastery Opportunity for Topic 12 & 13
				Mastery Redo Opportunity for Topics 1-11
Mon	3/23	14.1	9.1	Limits and Continuous Functions: Graphs & Tables pp553-554/ 1,3,7,9,11,13
Wed	3/25	14.2	9.2	Limits and Continuous Functions: Algebraically pp 553-554/ 17,21,23,25,31,41
		14.3	9.3	The Derivative with Limits 577-578/ 1a,2a,12,13
Mon	3/30	15.1	9.4	The Derivative with Formulas pp588-589/ 3,7,9,15,21,25,47
			9.9	Business Applications of the Derivative pp624-625/ 3,17,27
Wed	4/1			Required Mastery Opportunity for Topics 14
				Mastery Redo Opportunity for Topics 1-12
Mon	4/6	15.2	9.5	The Product Rule and the Quotient Rule pp596-597/ 3,7,11,17,39,41,43
			9.6	The Chain Rule pp603-604/ 5,7,17,39,41,47
Wed	4/8	15.3	9.7	Using Derivative Formulas Together pp610-611/ 13,15,17,37,41,43
		16.1	9.8	Higher order Derivatives pp615-616/ 1,3,7,11,17
Mon	4/13	16.2	10.1	Relative Maxima and Minima pp647-649/ 1,5,7,51,53

| | 16.3 | 10.2 | Concavity and Points of Inflection | pp660-662/ 23a,23b,35,39 |

Wed **4/15** Course Evaluations

Required Mastery Opportunity for Topics 15 & 16

Mastery Redo Opportunity for Topics 1-14

Tue **4/28** **Block 7A Final Exam (Mastery Redo Opportunity Topics 1-16)** **2:00 pm to 5:00pm**