

COURSE NAME: Application of Mathematics to Agricultural Economics

COURSE NUMBER: 11:373:211

PREREQUISITE: Pre-calculus or placement test

CONTACT INFORMATION:

Instructor(s): Dr. Isaac Vellangany, MBA., PhD.

Office Location: Cook Office Building, room 112

Phone: 848-932-9131 Email: isaacv@sebs.rutgers.edu

Office Hours: Virtual, by appointment via Zoom

COURSE WEBSITE, RESOURCES AND MATERIALS:

Learning Management System: Canvas

Required textbook: *College Mathematics for Business, Economics, Life Sciences, and Social Sciences*, 14th edition, 2019 | Pearson ISBN: 978-0-13-467414-8

COURSE DESCRIPTION:

This course introduces the mathematical techniques used in contemporary economics, including multivariable calculus, comparative statics, and unconstrained and constrained optimization. Emphasis is on applications of microeconomic and macroeconomic theory, and the interpretation and translation of mathematical results into economic terms.

COURSE OBJECTIVES:

1. Enable students of the basic facts of the calculus of functions of several variables, including calculation of partial derivatives of explicit and implicit functions, solutions of problems of unconditional and conditional optimization.
2. Students should be able to investigate economic problems of comparative statics using the methods of calculus, to discover points of maximum and minimum for functions of several variables, to use the method of Lagrange multiplier, to find extreme points of functions subjected to constraints.
3. Students should have skills of application of the indicated mathematical tools and methods to the solution of problems in Micro and Macroeconomics.

LEARNING GOALS:

1. Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, and words).
2. Use exponential and logarithmic functions to analyze the growth, interest compounding, and investment appraisal.
3. Demonstrate understanding of and ability to explain the economic applications of differentiation, and use it to formulate economic problems,

including marginal utilities, elasticity, marginal cost/ benefit, the marginal product of labor/capital.

4. Derive constrained optima using the Lagrange multiplier and substitution methods.
5. Understand and use these techniques to solve problems in economics optimization.
6. Utilize matrix algebra to find the unknowns Cramer's rule, Inverse Methods, and Gauss Markov elimination procedure use a graphic calculator.

ASSIGNMENTS/RESPONSIBILITIES, GRADING & ASSESSMENT:

Complete all the homework assignments and quizzes as specified below. The grade weights of these requirements are given in the table below. All homework assignments are to be turned in within the deadline. Any homework submitted after the due date will not be accepted. If you miss a quiz, you will receive a grade of zero for that quiz.

ALL QUIZZES AND TESTS WILL OPEN ON THURSDAYS 2:15 PM – 3:10

PM

Grade Components	Possible points	Percentage weight
Quiz 1: (09/15) Chapters 1 and 2	100	5
Quiz 2: (09/22) Chapter 3	100	5
Quiz 3: (09/29) Chapter 4	100	5
Quiz 4: (10/06) Chapter 5	100	5
TEST 1: (10/13) CHAPTERS 1 – 5	100	20
Quiz 5: (10/27) Chap 7-8	100	5
Quiz 6: (11/03) Chap 9-10	100	5
Test 2 (11/10) Chapters 7 - 10	100	20
Quiz 7: (11/17) Chap11	100	5
Quiz 8: (12/01) Chap 12	100	5
Quiz 9: (12/08) Chap 15	100	5
Data Analysis Assignment Not mandatory	100	5
TEST 3: TBA Chapters 10-12, 15 and Data analysis	100	20
Total	1300	100

Grading Scale:		
A 90 % and above	B+ 85%-89%	B = 80%-84%
C+ = 75%-79%	C 70%-74%	D= 61%-69%
F = 60%and below		

You are required to participate in all course activities.

ACCOMODATIONS FOR STUDENTS WITH DISABILITIES

Please follow the procedures outlined at <https://ods.rutgers.edu/students/registration-form>. Full policies and procedures are at <https://ods.rutgers.edu/>

ABSENCE POLICY

Students are expected to attend all classes; if you expect to miss one or two classes, please use the University absence reporting website <https://sims.rutgers.edu/ssra/> to indicate the date and reason for your absence. An email is automatically sent to me.

COURSE SCHEDULE:

Tentative schedule: (I reserve the right to alter the schedule as and when necessary, during the semester).

Week	Chapter contents	Comments
Part One Chapter 1: A Library Of Elementary Functions	Chapter 1 1. Linear Equations and Graphs 1.1 Linear Equations and Inequalities 1.2 Graphs and Lines 1.3 Linear Regression	Complete review exercise
Chapter 2: Functions and Graphs QUIZ 1 09/15	2.1 Functions 2.2 Elementary Functions: Graphs and Transformations 2.3 Quadratic Functions 2.4 Polynomial and Rational Functions 2.5 Exponential Functions 2.6 Logarithmic Functions	Complete Review exercises and takes quiz 1

Part Two Chapter 3: Finite Mathematics	3.1 Simple Interest 3.2 Compound and Continuous Compound Interest 3.3 Future Value of an Annuity; Sinking Funds 3.4 Present Value of an Annuity; Amortization.	Complete review exercises and takes quiz 2
Chapter 4: Systems of Linear Equations Matrices	4.1 Review: Systems of Linear Equations in Two Variables 4.2 Systems of Linear Equations and Augmented Matrices 4.3 Gauss-Jordan Elimination 4.4 Matrices: Basic Operations 4.5 Inverse of a Square Matrix 4.6 Matrix Equations and Systems of Linear Equations 4.7 Leontief Input-Output Analysis	Complete review exercises and takes quiz 3
Chapter 5: Linear Inequalities and Linear Programming	5.1 Linear Inequalities in Two Variables 5.2 Systems of Linear Inequalities in Two Variables 5.3 Linear Programming in Two Dimensions: A Geometric Approach	Complete review exercises and takes quiz 4

Chapter 6: Linear Programming: The Simplex Method NOT COVERED IN FALL 2022	6.1 The Table Method: An Introduction to the Simplex Method 6.2 The Simplex Method: Maximization with Problem Constraints of the Form \leq 6.3 The Dual; Minimization with Problem Constraints of the form \geq 6.4 Maximization and Minimization with Mixed Problem Constraints	
7: Logic, Sets, and Chapter Counting	7.1 Logic 7.2 Sets 7.3 Basic Counting Principles 7.4 Permutations and Combinations	

Chapter 8: Probability	8.1 Sample Spaces, Events, and Probability 8.2 Union, Intersection, and Complement of Events; Odds 8.3 Conditional Probability, Intersection, and Independence 8.4 Bayes' Formula 8.5 Random Variables, Probability Distribution, and Expected Value	Complete review exercises and takes quiz 6
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PART THREE: CALCULUS Chapter 10: Limits and the Derivative	10.1 Introduction to Limits 10.2 Infinite Limits and Limits at Infinity 10.3 Continuity 10.4 The Derivative 10.5 Basic Differentiation Properties 10.6 Differentials 10.7 Marginal Analysis in Business and Economics	Complete review exercise and take quiz 7
Chapter 11: Additional Derivative Topics	11.1 The Constant e and Continuous Compound Interest 11.2 Derivatives of Logarithmic and Exponential Functions 11.3 Derivatives of Products and Quotients 11.4 The Chain Rule 11.5 Implicit Differentiation 11.6 Related Rates 11.7 Elasticity of Demand	Complete review exercise and take quiz 8
Chapter 12: Graphing and Optimization	12.1 First Derivative and Graphs 12.2 Second Derivative and Graphs 12.3 L'Hôpital's Rule 12.4 Curve Sketching Techniques 12.5 Absolute Maxima and Minima 12.6 Optimization	Complete review exercise and take quiz 8
Chapter 14: Additional Integration Topics	14.1 Area between Curves 14.2 Applications in Business and Economics 14.3 Integration by Parts	
NOT COVERED IN FALL2022	14.4 Other Integration Methods	

Chapter 15: Multivariable Calculus	15.1 Functions of Several Variables 15.2 Partial Derivatives 15.3 Maxima and Minima 15.4 Maxima and Minima Using Lagrange Multipliers 15.5 Method of Least Squares 15.6 Double Integrals Over Rectangular Regions 15.7 Double Integrals Over More General Regions	Complete review exercise and take quiz 8
PART FOUR: DATA ANALYSIS	Descriptive and Inferential Statistics Simple and Multiple Regression Analysis	

Please Note Thanksgiving break 11/24 – 27

Wednesday November 23 – Friday class

FINAL EXAM/PAPER DATE AND TIME

Online Final exam Schedule: <http://finalexams.rutgers.edu/>

ACADEMIC INTEGRITY

The university's policy on Academic Integrity is available at <http://academicintegrity.rutgers.edu/academic-integrity-policy>. The principles of academic integrity require that a student:

- properly acknowledge and cite all use of the ideas, results, or words of others.
- properly acknowledge all contributors to a given piece of work.
- make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
- obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.
- treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that

- everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- all student work is fairly evaluated and no student has an inappropriate advantage over others.
- the academic and ethical development of all students is fostered.
- the reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

Email: Please do not enquire about your grade via email. It is the university policy that under no circumstances instructors are permitted to transmit grades via email. I will post all grades in the grade book in Canvas, and I will post the final grade on the Rutgers website within 48 hours after the final exam. I will respond to your weekend email on the first working day after that weekend.