Course Code: ECON 103	*Course Title*: Mathematics for Economists

Course Type (GED/Core/Elective): Core
Year/Level/Semester/Term: 1st Year
Academic Session: 2021-22 & 2022-23
Course Teacher/ Instructor:
Pre-requisite (if any): None
Credit Value: 04
Contract Hours: 60

Course Rationale: Most of the core courses in economics can be taught with mathematical tools besides verbal and graphical explanations. The mathematical tools help students attain analytical abilities to solve real problems. This course covers elementary mathematical techniques that are commonly used in economic analysis.

Course Objective: The purpose of this course is to develop mathematical tools and intuition, which will be valuable in analyzing a wide variety of economic problems, and equip students with the mathematical toolkit required for later coursework. Topics include set theory, functions, differential calculus, integration, series, and matrix algebra, with special emphasis on economic applications.

Course Learning Outcomes: After successful completion of the course, students will be able to:

1. understand the different types of functions and their economic implications;
2. know the principal results of single and several variable calculus, including calculation of derivatives, partial derivatives of both explicit and implicit functions;
3. solve optimization problems including optimization problems by substitution;
4. apply calculus to different comparative static problems to find maxima and/or minima of functions of single or several variables.

CLOs Mapped to PLOs

CLO/PLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9
CLO1	3	3	3	3	3	3	3	1	3
CLO2	3	3	2	2	3	2	3	2	3
CLO3	3	3	3	3	3	2	3	2	3
CLO4	3	2	3	3	3	2	2	3	2

Course Contents

Topic	Content Summary	Teaching Strategies/Tools	In-Class Assessment	#Class Hours	CLOs
1	**Role of Mathematics in Economics:** Mathematical vs. literary presentations of economic models; Equations; Variables; Real number system.	**Strategies**: Verbal and mathematical exposition; Problems solving **Tools**: Books; Handouts; Multimedia; Online resources	Q&As Quizzes Homework Assignments Presentations Tutorials	4	1
2	**Basic Concepts of Sets**: Definition and notations; Relationships between sets; Set operations; Ordered pairs; Cartesian product.	As above	As above	10	3, 4
3	**Functions and Relations:** Functions vs. relations; Domain and range; Linear, quadratic, cubic and higher degree polynomials; Exponential, logarithmic and rectangular hyperbolic functions; Intercept and slope of a function; Review of exponential rules.	As above	As above	6	1, 2, 3
4	**Systems of Linear Equations:** Solving systems of linear Equations; Applications in economics: One-commodity market models, Two-commodity market models, Determination of equilibrium price and quantity, Impact of tax and subsidy on equilibrium price and quantity, Burden of tax on producers and consumers, Benefits and Costs of subsidy.	As above	As above	8	2, 3
5	**Introduction to Matrix Algebra**: General notations; Basic matrix operations; Matrix transposition; Some special matrices; Determinants; Inverse matrix; Cramer's rule; Inverse matrix rule.	As above	As above	10	2, 3
6	**Derivatives**: Difference quotient and derivatives; Rules of differentiation; Geometric interpretation of derivatives; Partial derivatives; Applications of derivatives in economics - elasticity and partial elasticity; Comparative static analysis - Examples from national income and market models.	As above	As above	10	2, 3, 4
7	**Free Optimization**: Optimization of functions of one choice variable: Necessary conditions, Second order conditions; Optimization of functions of more than one choice variable: First-order conditions, Second-order conditions; Applications of free optimization in economics.	As above	As above	8	4

Class Schedule:

Lesson Plan

Week(s)	Topic(s)	# Classes	CLO(s)	Remarks
1 – 2	1	1 – 4	1	
3 – 5	2	5 – 10	1, 2, 3	
6 – 9	3	11 – 18	2, 3	***Class Test 1***: (**Topics 1 & 2**) 11th Class
10 – 14	4	19 – 28	2, 3	
15 – 19	5	29 – 38	2, 3, 4	***Class Test 2***: (**Topics 3 & 4)** 29th Class)
20 – 24	6	39 – 48	3, 4	
25 – 28	7	49 – 56	4	***Class Test 3***: (**Topics 5 & 6**) 49th Class
29 – 30	**1 - 7**	57 – 60		***Review***

Overall Evaluation Policy:

a. **Continuous Internal Evaluation (CIE): Marks - 00**

b. **Year-End Examination (YEE): Marks - 100**

Bloom's Category	Marks (100)
Remember	**10**
Understand	**20**
Apply	**40**
Analyze	**10**
Evaluate	**10**
Create	**10**

c. **Grading Scheme:** ***As in Section 19***

Policy for Make-Up Classes:

- Utilize the open slots in consultation with students
- Swap classes with colleagues

Basic Texts

1. Chiang, A. C., & Wainwright K. (2004). *Fundamental Methods of Mathematical Economics* (4th ed.). London: McGraw-Hill.
2. Hoy, M., Livernois, J., McKenna, C., Rees, R., & Stengos, T. (2011). *Mathematics for Economics* (3rd ed.). Cambridge, Massachusetts; London, England: The MIT Press.

Recommended References

1. Dowling, E. T. (2011). *Schaum's Outline of Theory and Problems of Introduction to Mathematical Economics*. New York: McGraw Hill Professional.
2. Jacques, I. (2018). *Mathematics for Economics and Business*. Harlow: Pearson.

Other Resources

- Online video lectures
- Course-packs
- Handouts