

Course Title	Mathematics
Course Code	MATH-109
Pre-Requisite	NA
Degree Program (BS / MS / PhD)	BS

Course Objectives

This course will help students understand and explain:

1. Set Theory
2. Function Partial Market Equilibrium and General Market Equilibrium
3. Linear Algebra
4. Matrices
5. Differentiation and Optimizations

Learning Outcomes

After the completion of the course, the students will be able to:

1. Understand mathematical models and functions
2. Comprehend mathematical language of sets
3. Handle matrices
4. Find optimum solutions for system of equations and inequalities
5. Constrained optimization
6. Understand Mathematical models applied in Economics

Contents

Week	Topic
1	Introduction; Mathematical and Non-mathematical economics; Mathematical economics versus Econometrics; Economics Models; Equations and Identities; Sets and Real numbers; Relations and Functions.
2	Equilibrium Analysis in Economics: Partial Market Equilibrium and General Market Equilibrium
3	Matrix Algebra; basic operations such as matrix addition and multiplication

4	Quiz 1: Topics Covered so far Matrix Algebra: Matrix Inversion and Cramer Rule
5	Matrix Algebra: Matrix Inversion and Cramer Rule
6	Quiz 2: On Matrix Algebra Gauss Markov Chains and Transition Matrices
7	Class activities on topics covered so far
8	Application of Matrix Algebra to Market and National-Income Models
9	Mid-Term Exam Week
10	Comparative Statics and the Concept of Derivative
11	Comparative Statics: Total Differentials, Derivatives of Implicit Functions
12	Quiz 3: (1) Comparative Statics and the Concept of Derivatives (2) Total Differentials, Implicit Differentiation Optimization
13	Maclaurin and Taylor Series, Exponential and logarithmic Functions,
14	Optimization of functions of more than one choice variables
15	Quiz 4: (1) Maclaurin and Taylor Series (2) Optimization of Functions of More Than One Variables Constrained Optimization
16	Constrained Optimization
17	Review of topics
18	Final – Term Exam Week

Readings List (including Books, Journals, Papers Articles, & Websites whatever is applicable)

1. Alpha C. Chiang & Kevin Wainwright. *Fundamental Methods of Mathematical Economics*. 2014, 4th Edition, McGraw-Hill Book Company.
2. Rosser, Mike, and Piotr Lis (2016). *Basic mathematics for economists*. Routledge.
3. Akihito Asano. *An Introduction to Mathematics for Economics*. 2013, Cambridge University Press. Refer to Chapter 1, 2, 4, 5, 6, and Appendix A.
4. Hoy, M., Livernois, J., McKenna, C., Rees, R., & Stengos, T. (2011). *Mathematics for economics*. MIT press.