

ECONOMICS (HONOURS)

ECS-7704-(4)

**Skill Enhancing Course -1
MATHEMATICAL METHODS FOR ECONOMICS**

OBJECTIVES:

Students are able to

- Understand the basics of sets, functions and their graphical representation;
- Learn the rules of differentiation and apply the same to economic problems;
- Learn and use maxima and minima to Optimization problems in economics;

Learning Outcomes:

After completing the course, the student is expected to perform the following:

- Apply rules of integration to estimate the size of consumers' and producers' surpluses;
- Solve the macroeconomic problems through the application of the Matrix Theory.

Module 1: Sets & Functions

(12 Hours)

Role of Mathematical Methods in Economics - Sets: Types, Operations – Cartesian Product Set – Relations – Meaning of Functions - Types of Functions: Linear, Quadratic Polynomial and Exponential Functions – Graphical Representation of Functions – Applications of functions in Economics.

Module 2: Differential Calculus

(14 Hours)

Limits of Functions – Converging, Diverging and Oscillating Sequences – Continuity and Differentiability of a Function – Derivative of a Function – Derivative and Slope of a Curve – Rules of Differentiation - First, Second and Higher Order Derivatives – Differentiation of Multivariable Function – Partial Derivatives – Total Differential - Interpretation of First and Second Order Derivatives - Applications of Derivatives in Economics - Euler's Theorem.

Module 3: Optimization Problems and their Applications

(10 Hours)

Optimization - Problems of Maxima and Minima of Single and Two Independent Variables - Unconstrained & Constrained Optimization - Kuhn Tucker Formulation and Lagrange Multiplier - Envelope Theorems - Some Applications of Optimization in Economics.

Module 4: Integrations and Linear Programming

(13 Hours)

Concept of integration - Simple Rules of Integration - Application of Integrations in Economics – Consumer and Producers' Surplus – Growth Models - Linear Programming: Basic Concept, Formulation of a Linear Programming Problem - Structure and Variables - Nature of Feasible, Basic and Optimal Solution - Applications of Liner Programming in Economics.

Module 5: Matrices and Determinants and Applications in Economics (11 Hours) Matrix: Concept, Types – Matrix Operations: Addition, Multiplication – Determinants – Properties of Determinants – Inverse of a Matrix – Solution to the System of Simultaneous Equations - Cramer's Rule - Some Applications of Matrix Theory in Economics

References:

1. Alien, R.G.D. (1974), *Mathematical Analysis for Economists*, Macmillan Press and ELBS, London.
2. Chiang, A.C. (1986), *Fundamental Methods of Mathematical Economics*, McGrawHill, New York.
3. Yamane, Taro (1975), *Mathematics for Economists*, Prentice Hall of India New Delhi.
4. Heijdra, B.J. and V.P. Fredericck (2001), *Foundations of Modern Macroeconomics*, Oxford University Press, New Delhi.
5. Knut Sydsaeter and Peter Hammond (2008), *Mathematics for Economic Analysis*. Pearson education.
6. Open Source Online Materials & Videos: IGNOU, e-PG Pathasala, SWAYM, KhanAcademy etc.

Student Activities:

1. Exercises of mathematical problems for economics
2. Assignments on the use of mathematical models for basic concepts and models in economics
3. Student seminars and quizzes on mathematical techniques and their applications in economics
4. Task Based Learning (TBL) for solving and application of the mathematical model in economics