

TEMPLATE FOR COURSE SYLLABUS FOR NEP IMPLEMENTATION

Discipline: Science ☒ Arts, Humanities & Social Science ☒
Commerce ☐ BBA ☐ BCA ☐

Subject Name: ECONOMICS

Subject Code: UECOMAJ2

Semester: Semester I ☐ Semester II ☐ Semester III ☐ Semester IV ☒
Semester V ☐ Semester VI ☐ Semester VII ☐ Semester VIII ☐

Course Name: MATHEMATICAL METHODS FOR ECONOMICS

Course Code: UECOMAJ24006

Course Credit: Theoretical 3 Practical/Tutorial 1

Marks Allotted: Theoretical 60 Practical/Tutorial

Continuing Evaluation 10 Attendance 5

Course Type (tick the correct alternatives):

Major Core ☒ AEC ☐
Interdisciplinary/ DSE ☐ SEC ☐
Minor / Generic Elective ☐ VAC ☐
Research Project/Dissertation ☐ Vocational ☐

Is the course focused on employability/entrepreneurship? YES ☒ NO ☐

Is the course focused on imparting life skills? YES ☐ NO ☒

Is the course based on Activity? YES ☐ NO ☒

Remarks by Chairman, UG BOS, if any

UG BOS Meeting Reference Number: 25/UG-24

Date: 10/05/2024

Course Code: UECOMAJ24006

Course Name: Mathematical Methods in Economics

Brief Course Description:

This course has five modules. The course aims to give the students some background on mathematical tools that can be used for analysing economic ideas. It focuses on the Mathematical Methods in the first place and then uses the methods to understand and investigate economic models. Mathematical Methods in Economics are linked with both Micro and Macro Courses.

Prerequisite(s) and/or Note(s):

- (1) Knowledge of high school-level mathematics is required.
- (2) Prior knowledge of economics at the +2 level will be useful.

Course Objectives:

Knowledge acquired:

- (1) To equip the students to understand the most important mathematical methods used in economics.
- (2) To illustrate the use of these techniques by applying them to various well-known economic models.
- (3) To use appropriate techniques to solve problems with calculus and linear algebra.

Skills gained:

- (1) Students will be able to understand the basic and relevant mathematical methods used in economics.
- (2) Students can use linear algebra and calculus to solve economic problems

Competency Developed:

- (1) Students can formalise economic problems as theoretical models and use mathematical methods to interpret such models. This would also help prepare study reports.
- (2) Students will acquire the knowledge required to study advanced economics courses in subsequent semesters.

Course Syllabus:

Module I- Preliminaries and Functions of one real variable: [8 hrs]

Convex sets, geometric properties of functions- concave functions, convex functions, the characterizations, properties and applications of concave and convex functions, point of inflexion.

Module II- Linear Models and Matrix Algebra: [9 hrs]

Vectors and Matrices, Matrix operations, Transposes and Inverses, Identity Matrices and Null Matrices, Elementary matrices, Rank of a Matrix, Determinants and its Basic Properties, Solution of a system of linear equations- Cramer's rule, Eigen values and Eigen vectors, Quadratic form of a matrix and its signdefiniteness --- The application of Principal Axes Theorem.

Module III- Differential Equations: [9 hrs]

Definition of Differential Equation, Solution of Differential Equations, First Order and Second Order Differential Equations with constant coefficients and constant term, Applications in Economics- Time Path of Price and Quantity in Competitive Markets, Time Path of Income in Simple Keynesian Model, Stability Model.

Module IV- Difference Equations: [9 hrs]

Definition of Difference Equation, Solution of Difference Equations, First Order and Second Order Difference Equations, Applications in Economics- The Cobweb Model, Nature of the Time Path – A Graphical Analysis, Interpretation of the Time Path, The Multiplier Accelerator Interaction Model.

Module V- Linear Programming: [10 hrs]

Definition of Linear Programming, Formulation of LPP, Convex sets and Linear Programming, Graphical Solution Methods, Slack Variables, Basic Feasible Solutions, Simplex Method for Solving a Maximization and Minimization Problem (two variable case only), Duality of Linear Programming, Degeneracy, Economic Interpretation of Duality.

Tutorial Classes: [15 hrs]

Tutorial classes are held to clarify the contents of the course. Such classes are meant to promote teacher-student academic interactions and help to build a student's confidence and self-esteem.

Continuing Evaluation:

The course instructor will finalise the modalities of the continuing evaluation. A few suggestions for continuing evaluation are (a) a written examination, (b) a take-home assignment, and (c) a presentation on the topic suggested by the course instructor.

Suggested Readings:

- Allen, R. G. D.: Mathematical Analysis for Economics, Macmillan.
- Alpha C. Chiang and Kevin Wainwright: Fundamental Methods of Mathematical Economics, Mc Graw Hill, 2005.
- Bailey, D.: Mathematics in Economics, McGraw Hill

- Carl P. Simon and Lawrence Blume, Mathematics for Economists, W.W. Norton and Company, New York, London.
- Dorfman, R., Samuelson, P.A. and Solow, R.M., Linear Programming and Economic Analysis, McGraw-Hill, 1958.
- Edward T. Dowling: Introduction to Mathematical Economics, Schaum's Series
- Hadley, G., Linear Algebra, Addison-Wesley Publishing Company, 1977
- Michael Hoy, John Livernois, Chris McKenna, Ray Rees and Thanasis Stengos: *Mathematics for Economics*, PHI Learning.
- K. Sydsaeter and P. Hammond, Mathematics for Economic Analysis, Pearson Educational Asia: Delhi, 2002.
- Mukherjee, B. and Pandit, V.: Mathematical Methods for Economic Analysis, Allied.
- Mukherji and S. Guha: Mathematical Methods and Economic Theory, Oxford University Press, 2011.
- Silberberg, E. and Suen, W.: The Structure of Economics: A Mathematical Analysis, Third edition, Mc-Graw Hill, 2001.
- Yamane, Taro: Mathematics for Economists – An Elementary Survey, Prentice Hall.