

## Indian Institute of Technology Kanpur

### Proposal for a New Course

**1. Course No:** ECO671A

**2. Course Title:** Mathematical Methods for Economics

**3. Per Week Lectures:** 3 (L), Tutorial: 0 (T), Laboratory: 0 (P), Additional Hours: 0

Credits: (3\*L+T +P+A):

**Duration of Course:** Full Semester Course

**4. Proposing Department:** Economic Sciences

**Other Departments which may be interested:** None

**5. Proposing instructor:** Faculty members of the department of economic sciences

**Level of the course:** PG

**6. Course Description:** The course introduces students to a range of foundational mathematical concepts and techniques routinely used in economic theory and quantitative modeling for economics, finance and business. The concepts and techniques will be derived from basic principles and illustrated using a variety of applications. The course covers selected topics in linear algebra, calculus of several variables, static optimization, and an introduction to dynamics.

**A) Objectives:** The course introduces students to a range of foundational mathematical concepts and techniques routinely used in economic theory and quantitative modeling for economics, finance and business.

#### **B) Contents**

S. No	Broad Title	Topics	No. Lectures
1	Introduction	Nature of mathematical economics; economic models; basic mathematical logic.	4
2	Linear Algebra	Systems of Linear Equations; Matrices and Vectors, Determinants, Euclidean Spaces, Linear Independence, Quadratic Forms and Definite Matrices; Eigenvalues and Eigenvectors; Applications.	6
3	Calculus of Several Variables	Function of Several Variables, Limits, Continuity, Differentiability, Partial Differentiation, Differentials, Taylor Polynomials; Derivatives of Implicit Functions;	6

		Homogenous and Homothetic Functions; Concave and Quasi-concave Functions; Applications.	
4	Optimization	Unconstrained Optimization; Constrained Optimization: Equality and Inequality; Comparative Statics; Envelope Theorems; Applications.	6
5	Dynamics	Economic Dynamics and Integral Calculus; Differential and Difference Equations; Phase Diagrams; Applications.	4

**C) Prerequisites:** None.

**D) Short summary for including in the Courses of Study Booklet:** The course introduces students to a range of foundational mathematical concepts and techniques routinely used in economic theory and quantitative modeling for economics, finance and business. The concepts and techniques will be derived from basic principles and illustrated using a variety of applications. The course covers selected topics in linear algebra, calculus of several variables, static optimization, and an introduction to dynamics.

#### 7) Recommended books

Reference books:

Mathematics for Economists by Carl P. Simon and Lawrence E. Blume. Viva Books/Norton.

Mathematics for Economics by Michael Hoy, John Livernois, Chris McKenna, Ray Rees and Thanasis Stengos. MIT Press.

Mathematical Methods and Models for Economists by Angel de la Fuente. Cambridge University Press.

Foundation of Mathematical Economics by Michael Carter. MIT Press.

**8) Any other remarks:** None.

Dated: 04/10/2022 Proposer: Dr. Bikramaditya Datta

Dated: \_\_\_\_\_ DUGC/DPGC Convener: \_\_\_\_\_

**The course is approved / not approved**

**Chairman, SUGC/SPGC**

**Dated: \_\_\_\_\_**