Course Syllabus
Gyanmanjari Institute of Arts
Semester-3 (M.A)

Subject: Quantitative Methods-MATEC12512

Type of course: Major (Core)

Prerequisite:

The prerequisite for this syllabus is a basic understanding of mathematics and introductory microeconomics. Students should be familiar with concepts such as functions, equations, differentiation, and basic economic principles like supply and demand, consumer theory, and producer theory. Additionally, some exposure to introductory calculus and algebra would be beneficial for understanding the mathematical methods and models covered in this syllabus.

Rationale:

This syllabus aims to equip students with a strong mathematical foundation and analytical skills necessary for understanding and solving complex economic problems. The combination of matrix algebra, calculus, integration, optimization, and game theory provides a well-rounded approach to economic analysis and decision-making.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
4	0	0	4	60	30	10	00	50	150

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; V – Viva; CCE-Continuous and Comprehensive Evaluation; ALA- Active Learning Activities.

Course Content:

Unit	Course content	Teaching Hours	Marks /Weight
1	**Matrix Algebra and Economic Analysis** • Concept of Matrix and Determinant – their types • simple operations on matrices • matrix inversion and rank of matrix • Solution of simultaneous equations through Cramer's rule and Matrix inverse method • Introduction to input-output analysis.Bain's limit pricing theory	15	25
2	**Mathematical Methods in Economic Analysis** • Rules of differentiation • Elasticity and their types • Rules of Partial differentiation and interpretation of partial derivatives • Problems of maxima and minima in single and multivariable functions • Unconstrained and constrained optimization in simple economic problems	15	25
3	**Economic Analysis through Integration and Difference Equations** • Concept and simple rules of integration • Application to consumer's andproducer's surpluses. Difference equations – Solution of first order and second order difference equations • Applications in trade cycle models • Growth models and lagged market equilibrium models	15	25
4	**Optimization and Game Theory in Economics** • Linear programming – Basic concept • Nature of feasible, basic, and optimal solution • Solution of linear programming problem through graphical and simplex method. • Concept of a game • Two-person Zero-sum game	15	25

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Interactive Matrix Operations** Students will work in small groups, performing matrix operations (addition, subtraction, multiplication)and explaining their approaches. They will then upload their solutions to the GMIU Web portal for evaluation.	10
2	**Elasticity Scavenger Hunt** Students will make a list of products and locate real-world instances demonstrating various elasticities (e.g., price elasticity of demand, income elasticity of demand), subsequently presenting their findings, discussing implications, and uploading them to the GMIU Web portal.	10
3	**Presentation** The teacher will let the students prepare a topic related to the subject and the student will prepare it and present it. and will upload it to GMIU Portal.	10
4	**Integration in Action:** Assign students to analyze a specific economic phenomenon (e.g., consumer surplus) using integration techniques to calculate its value; they will then present their findings, discuss the implications for decision-making, and upload their work to the GMIU Web portal.	10
5	**Course Summary Activity:** The course will be divided into different sections by the teacher and each group of students will be assigned a section to summarize. The groups will then upload their summary on the GMIU web portal ensuring a comprehensive understanding of the syllabus.	10
	Total	50

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	40%	40%	00	00	00

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course, the students should be able to:	
CO1	Understand the fundamental concepts of matrices and determinants, including their types and properties.
CO2	Utilize partial differentiation and interpret partial derivatives in economic contexts.
CO3	Solve first-order and second-order difference equations and apply them to dynamic economic models, such as trade cycle models.
CO4	analyze two-person zero-sum games, providing insights into competitive decision-making strategies and outcomes in economic scenarios.

Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.
Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

References:

[1]. Hoy, M., Livernois, J., McKenna, C., Rees, R., &Stengos, T. (2004). *Mathematics for Economics*. PHI.

[2]. Mouhammed, A. H. (2003). *Quantitative Methods for Business and Economics*. PHI.

[3]. Aggarwal, D. R. (Year). *Quantitative Methods*. [Publishing information not provided]

[4]. Joshi, R. C. (Year). *Basic Mathematics for Economists*. New Academic Publishing.

[5]. Leontief, W. (1936). Quantitative input-output relations in the economic systems of the United States. *Review of Economics and Statistics, 18*, 105-125.

[6]. Miller, R. E., & Blair, P. D. (1985). *Input-Output Analysis: Foundations and Extensions*. Prentice-Hall.