

Course Code	Course Name	Credits
26EC508	ADVANCE QUANTITATIVE TECHNIQUE-II	04

Course Objectives

- To enable students to explain and analyze the fundamental concepts of financial mathematics and interpret the relationship between interest rates and bond prices.
- To develop the ability to solve and apply matrices, determinants, Cramer's rule, inverse matrices, and input-output analysis.
- To explain and apply various rules of differentiation and their applications in economics.
- To understand and classify differential equations and identify their order and types.
- To apply and evaluate the concepts of linear programming in solving real-life business problems

Learning Outcomes

After the Upon successful completion of this course it is intended that a student will be able to:

- Solve problems related to financial mathematics.
- Explain, compute, and apply concepts of matrices and determinants, including solving minor and higher-order matrices.
- Derive, analyze, and solve different types of differential and applying them in growth model.
- Know the application of Difference equation in different growth rate
- Apply and evaluate linear programming techniques and basic strategies of game theory in decision-making contexts.

Unit 1 – Financial Mathematics (12Hrs)

Interest rate (simple and compound) Net Present Value. Loan Repayment. Annuities and Sinking Fund. Relationship between Interest Rate and Price of Bonds.

Unit 2 –Matrix and Determinant (12Hrs)

Determinants- concept and properties, solutions for simultaneous equations- Cramer's Rule. Matrix- Application of matrix arithmetic, Cramer's rule in market equilibrium and income determination. Input-Output Analysis: open and closed models.

Unit 3 – Differentiation and its Application (12Hrs)

MR, AR, TR, MC, AC, TC. Elasticity of demand- point and Constant. Tax Yield. Production function (Law of diminishing returns). Returns to Scale. Profit Maximization. Unconstrained optimization with two variables.

Unit 4 –Difference Equations (12Hrs)

Application of difference equation – homogeneous and non-homogeneous determination. Lagged income model. Cobweb and Harrod-Domar.

Unit 5 –Linear Programming and Game Theory (12Hrs)

Linear programming- concept and formulation of LP problems, solution- graphical and simplex methods, dual formulation and interpretation, shadow prices and their uses. Concept of game- Strategies- Saddle point solution mixed and value of game.

Reference Books:

1. Fundamentals of Mathematical Statistics- S.C Gupta & V.K Kapoor, Sultan Chand & Sons Publication, 11th Revised Edition (2002).
2. Statistical Methods- S.P Gupta, Sultan Chand & Sons, 42nd Revised Edition (2012).
3. Mathematics & Statistics for Economics- G.S Monga, Vikas Publishing House Pvt,Ltd, 2nd Revised Edition (2009).
4. An Introduction to Mathematical Statistics and its Application- Richard J. Larsen & Morris L.Marx, Prentice Hall. (2011).
5. Comprehensive Statistical Methods: P.N Arora, SumeetArora, S.Arora, S.Chand& Company, 4th Revised Edition (2012).

Websites and eLearning Sources:

1. <https://www.sciencedirect.com/journal/journal-of-mathematical-economics>
2. <https://mathoverflow.net/questions/60685/reference-for-mathematical-economics>
3. <https://www.springerprofessional.de/en/mathematical-economics/17341494>
4. <https://openlibrary.telkomuniversity.ac.id/pustaka/155640/basic-mathematics-for-economists-3-e.html>

COs and Bloom's Taxonomy Mapping – 26EC508

Course Outcomes	On successful completion of this course, students will be able to	BTL
CO1	Understand financial mathematics concepts such as interest rates, annuities, loan repayment, and recall the relationship between price and interest	K1, K2
CO2	Apply matrices and determinants to solve economic models and simultaneous equation, including market equilibrium and input-output analysis	K3
CO3	Use differentiation techniques to analyze economic functions like cost, revenue, elasticity, and optimization problems with two variables	K4,K5
CO4	Analyze and solve difference equations and interpret economic models such as cobweb and different growth models	K4
CO5	Apply linear programming and game theory techniques for decision-making and optimization in business contexts and strategies of game theory	K3,K4,K5

BTL (Bloom's Taxonomy Level) - K1 – Remembering, K2 – Understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6 - Create

Relationship Matrix – 26EC508

Course Outcomes	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	3	1	1	2	3	2	1	1	1.90
CO2	3	3	2	3	2	1	2	3	3	1	1	2.18
CO3	3	3	3	2	2	1	2	3	3	1	1	2.18
CO4	3	3	2	3	1	1	2	3	3	1	1	2.09
CO5	3	3	3	3	2	2	2	3	3	1	1	2.36
Total												2.14

Mean Score: 3- High, 2- Medium/Moderate, 1-Low

