Code:MAT5012: Game Theory Prerequisites: Probability theory, linear algebra, linear programming, and calculus.	L	T	P	Credit
	3	2	0	4

Course Category	Elective
Course Type	Theory
Course Objective	This course will meet the following objectives Provide a foundation in the basic concepts of Game Theory Understand Nash's equilibrium Understand Cooperative v/s Non-Cooperative games
Course Outcome(s)	Gain a proper understanding of game theoretic concepts and modeling:

	covering equilibrium in static and dynamic games, with varying information structures. Be able to apply game models to the analysis of decisions in various business environments. Responding appropriately to competitors' pricing strategies in various small markets, Building and sustaining reputation in repeated business relations; Using and interpret rating strategic communication in effective ways; Responding sensibly to threats and promises of competitors; Organizing contractual relations intelligently with respect to property rights and investments

Syllabus:

Introduction: rationality, intelligence, common knowledge, von Neumann-Morgenstern utilities;

Noncooperative Game Theory: strategic form games, dominant strategy equilibria, pure strategy Nash equilibrium, mixed strategy Nash equilibrium, existence of Nash equilibrium, computation of Nash equilibrium, matrix games, minimax theorem, extensive form games, subgame perfect equilibrium, games with incomplete information, Bayesian games.

Mechanism Design: Social choice functions and properties, incentive compatibility, revelation theorem, Gibbard-Satterthwaite Theorem, Arrow's impossibility theorem, Vickrey-Clarke Groves mechanisms, dAGVA mechanisms, Revenue equivalence theorem, optimal auctions.

Cooperative Game Theory: Correlated equilibrium, two person bargaining problem, coalitional games, the core, the shapley value, other solution concepts in cooperative game theory.

Text books:

1. Y. Narahari, Game Theory and Mechanism Design, IISc Press and the World Scientific, 2014.

References:

1. Roger B. Myerson, Game Theory: Analysis of Conict, Harvard University Press, September 1997.
2. Martin J. Osborne, An Introduction to Game Theory, Oxford University Press, 2003.

Code:MAT5013: Mathematical Finance Prerequisites: Probability theory and Differential Equations.	L	T	P	Credit
	3	2	0	4

Course Category	Elective
Course Type	Theory
Course Objective	The primary goal of this course is to teach students some necessary mathematical techniques and how to apply them to the fundamental concepts and problems in financial mathematics and their solution.
Course Outcome(s)	The main contents include: Introduction to probability theory, random variable, probability density, mean, and variance of a random variable. The applications include interest rate, coupon bonds, arbitrage, Brownian