राष्ट्रीय प्रौद्योगिकी संस्थान पटना / NATIONAL INSTITUE OF TECHNOLOGY PATNA
संगणक विज्ञान एंव अभियांत्रिकी विभाग / DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
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No:- Date:

CSXX2011 ***Game Theory*** **L-T-P-Cr: 3-0-0-3**

Course Outcomes:
At the end of the course, a student should have:

Sl. No.	Outcome	Mapping to POs
1.	Understanding the basic game theory concepts, including utility, strategies, and Nash equilibrium	PO1, PO3
2.	Knowledge of advanced game theory concepts, such as repeated games, signalling games, and mechanism design.	PO3
3.	Understanding the limitations of game theory and its relationship to other decision-making frameworks.	PO2, PO3
4.	Developing critical thinking skills and the ability to apply game theory to evaluate and design strategies in different domains.	PO2, PO3
5.	Knowledge of the use of game theory in various fields, such as economics, political science, and computer science.	PO3

Unit 1 — 10 Lectures

Elements of Game theory, examples, Strategic Games, Two Player Strategy Games, payoffs, Minimax, Weak and Strong Domination, Saddle Points, Nash Equilibrium, Prisoner's Dilemma, Stag Hunt, Matching pennies, BOS, Multi NE, Cooperative and Competitive Games, Strict and Non Strict NE, Best response functions for NE.

Unit 2 — 10 Lectures

Combinatorial games, Winning and losing positions, Subtraction Game, 3-Pile and K-Pile Games, Proof of Correctness, Variations of K-Pile Games, Graph Games, Construction, Proof of finiteness, SG theorem for sum of games.

Unit 3 — 10 Lectures

Cournot's Oligopoly, Bertrand's Oligopoly, Electoral Competition, Median Voter Theorem, Auctions, role of knowledge, Decision making and Utility Theory, Mixed Strategy Equilibrium, Extensive Games with Perfect Information, Stackelberg's model of Duopoly, Buying Votes, Committee Decision making, Repeated Gmes, Prisoner's Dilemma, Supermodular Game and Potential games

Unit 4 — 12 Lectures

Wireless Networks: Resource Allocations, Admission Control, Routing in Sensor and AdHoc Networks, Modeling Network Traffic and Strategic Network Formation, Rubinstein Bargaining Model with Alternating Offers, Nash Bargaining Solution, Relation of Axiomatic and Strategic Model, Auction and Mechanism Design with Applications, Revenue Equivalence, Risk Averse Bidders, Asymmetries among Bidders, Mechanism, Optimal Mechanism

Text Books:

Martin Osborne, An Introduction to Game Theory, Oxford University Press.

Reference Books

1. Thomas Ferguson, Game Theory, World Scientific, 2018.
2. Stef Tijs. Introduction to Game Theory, Hindustan Book Agency.
3. Allan MacKenzie, Game Theory for Wireless Engineers, Synthesis Lectures On Communications.