

Course Description Format

TITLE : Introduction to Game Theory

Course Code :

CREDITS : 3-0-0-4

TYPE-WHEN : MONSOON 2016

FACULTY NAME :

PRE-REQUISITE : Basic Knowledge in Linear Algebra, Probability Theory and comfortable in basic maths

OBJECTIVE :

Game theory is a mathematical model to analyze and predict behavior of strategic agents. In the modern world, where every individual has access to the Internet and immense computing power, game theory has become an important, useful and relevant tool in day to day life to design protocols in various contexts, analyze negotiations or induce cooperation. The objective in this course is to introduce students to game theory and different types of games such as non-cooperative games, cooperative games, games with incomplete information. Additionally the students will be exposed to various tools and solution concepts in game theory.

COURSE TOPICS :

- (a) What is game? Extensive form games vs strategic form games, two player zero sum games, mini-max theorem, dominant strategy equilibrium, Nash equilibrium and its existence. Co-operative game theory, core, imputations, Shapley value, Nash bargaining solution.
- (b) Mini-max Theorem, Nash Theorem, Shapley's Theorem for core and algorithmic aspects of these theorems.
- (c) Game with incomplete information, introduction to mechanism design, revelation principle, voting schemes.
- (d) Application of the above concepts will be illustrated with use cases in wireless communication, e-Commerce, social networking, crowdsourcing and, cloud management. (If time permits, advance topics such as) Arrows impossibility theorem, price of anarchy in routing games.

PREFERRED TEXT BOOKS:

“Game Theory and Mechanism Design” by Y Narahari.

***REFERENCE BOOKS:**

“Game Theory: Analysis of Conflict”, by Roger B. Myerson.

***PROJECT:**

Students are expected to work in groups and develop a small software in Java to compute various solution concepts taught in the class.

GRADING PLAN:

Type of Evaluation	Weightage (in %)
Mid Sem-1 Exam	20
Mid Sem-2 Exam	20
End Sem Exam	40
Assignments	10
Project	10
Term Paper	-
Other Evaluation _____	

OUTCOME:

At the end of the course a student should be able to

- (i) Model and generate strategies for two person games.
- (ii) Take a strategy decision problem and model it as appropriate game theoretic problem
- (iii) Understand of different kinds of games and what kind of solutions are possible and their meaning
- (iv) Apply mechanism design to design games for specific outcomes.

REMARKS: The course is designed for senior undergraduate students. Post-graduate students are also welcomed.