Course Syllabus-Winter 2014.

Math 592

Special Topics in Mathematics: Game Theory and Applications

Dr. Slim Belhaiza

Description:

This course conveys an introduction to game theory and its most important concepts. Games in strategic and extensive forms are studied through the concept of Nash equilibrium and its refinements. The Correlated, perfect and proper refinements are specially emphasized. Many applications in different fields are studied. A special focus is made on game theory models in Computer Engineering, Electrical Engineering, Finance and Economics.

Textbooks suggested:

- Main Text Book

Game Theory: Analysis of Conflict, Roger B. Myerson, 1997, Harvard University Press.

- Reference Text Book

Game Theory, D. Fudenberg and J. Tirole, 1991, MIT Press.

Prerequisite:

Graduate Standing.

It is required for the students attending the course to be familiar with linear algebra, linear and non-linear programming. However, if the students ask for a review of the most important mathematical tools used in this course, a help session could be organized.

Course Objectives:

Familiarize graduate students and researchers from Electrical Engineering, Computer science, Management and others to the main game theory concepts and models required for the achievements of their research projects.

Expected students:

Mostly graduate students from all scientific, engineering and management disciplines.

Suggested Content

Course Chapter	Textbook Chapter	Nbr of Hours
1. Introduction to Game Theory; - Rationality. - Utility maximization. - Applications.	[Chapter 1- Decision-Theoretic Foundations]	(3 hours)
2. Basic Models; - Games in Extensive Forms. - Strategic form games and Normal representation. - Domination and Reduced normal representation. - Applications.	[Chapter 2- Basic Models]	(6 hours)
3. Equilibria of Strategic-Form Games; - Nash Equilibrium. - Computing Nash Equilibria. ~~- Bayesian Equilibria.~~ - Applications.	[Chapter 3- Equilibria of Strategic-Form Games]	(9 hours)
4. Sequential Equilibria of Extensive Games; - Sequential Rationality. - Computing Sequential Equilibria. - Subgame-Perfect Equilibria. - Applications.	[Chapter 4- Sequential Equilibria of Extensive Games]	(9 hours)
5. Refinements of Nash equilibrium - Perfect Equilibria. - Proper Equilibria. - Correlated Equilibria. - Applications.	[Chapter 5- Refinements of Equilibrum in Strategic Form]	(9 hours)
6. Repeated Games; - General Model of Repeated games. - Repeated Games with Standard Information. - Repeated Games with Incomplete Information. - Applications.	[Chapter 7- Repeated Games]	(9 hours)

Grading Policy:

- **Home works; 20%**
- **One major exam; 25%.**
- **Term paper; 25%.**
- **Final Exam; 30%.**

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