

Game Theory in Economics

Syllabus

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A PhD student at AMSE is upset: he was assigned to the second doctoral students' office when he would have preferred to be assigned to the first one (*Matching theory*). He is unhappy with the decision and blames the method used for the election of doctoral student representatives (*Voting theory*), since he feels misrepresented. He even threatened to leave the doctoral school, but his threat was not credible (*Sequential game*).

The PhD student thinks that all PhD students would be better off in a different organization of the offices (*Inefficiency of equilibrium*), he would like to share his sorrow with his friends, but he has few of them (*Network theory*). There was this other PhD student, his confidant, but she has been angry with him since the day they cooked a cake together and he ate more than his half (*Cooperative game theory*).

If only he knew game theory...

Course's objective

By helping the PhD student in the six above situations where game theory is useful, we also present how games are used in different areas of economic research. The course is divided in six classes (6 x 2 hours) and each class introduces a problem that uses a different branch of game theory.

The objective is to present the theoretical concepts and to look for applications of these concepts outside the field of pure theory. When possible, recent papers written by AMSE researchers are presented as applications.

Course materials

Slides will be available on AMeTICE.

Evaluation

Small exercises will be given between lectures to check the understanding of the covered concepts.

Preliminary schedule

Lecture 1: Cooperative Games

"How to share a cake that several people cooked together?"

Tools presented: Core of a game, Shapley value.

Application: in Machine Learning "The Imaginary Healthy Patient" (Amady Ba, Ewen Gallic, Pierre Michel, Alain Paraponaris, and Juliette Spinnato).



Lecture 2: Matching

"How should PhD students be allocated to PhD offices?"

Tools presented: Top Trading Cycles, Gale-Shapley.

Application: "Spousal Preferences and Marriage Patterns, Data from China" (Eva Raiber, Weiwei Ren, Jeanne Bovet, Paul Seabright and Charlotte Wang).



Lecture 3: Sequential Games

"Should my threats be credible in order to be efficient in a negotiation?"

Tools presented: Backward induction, Subgame perfect equilibrium.

Application: in Gender "Entrepreneurship within the Household" (Renaud Bourlès, Sarah Vincent, Roberta Ziparo)



Lecture 4: Efficiency of Equilibrium

"Should we force people to be nice?"

Tools presented: Inefficiency of Nash equilibrium, Price of anarchy.

Application: in location game "Location Games on Networks" (Gaëtan Fournier, Marco Scarsini)



Lecture 5: Voting

"Should we change the way we run elections?"

Tools presented: Plurality rule, Borda count, Voting by grading, Condorcet's Paradox.

Applications: TBD



Lecture 6: Games on Network

"Why do I have fewer friends than my own friends have?"

Tools presented: Local interactions, Centrality.

Applications: TBD

