Game theory and applications

Syllabus

Instructor: Maxim Goryunov

Description

The course is divided into two parts. The first part is an introduction into fundamental concepts of game theory. It provides students with a toolbox for the second part of the course, which is devoted to application of game theory to real world issues.

Intended Audience and Prerequisites

The course is intended for senior undergraduates and graduate students from all fields of studies. In addition, anyone interested in game theory and/or modern economic research is welcome.

The course draws on mathematical modeling of games. Thus, basic mathematical and logical skills are necessary. Course in calculus and in probability will be an advantage.

Grading

The grade will be based on the homework for the first half of the course (20%) and the final exam (80%).

Topics

The course consists of 16 two hour lectures. The list and order of topics:

1. Introduction. Basic concepts. Classification of games.
2. Strategic games of complete information. Dominance and rationalizability. Common knowledge.
3. Nash equilibrium. Coordination game. Matching pennies game.
4. Mixed strategies. Nash equilibrium in mixed strategies. Common interpretations of mixing.
5. Dynamic games of complete information. Backward induction. Role of commitment.
6. Static games of incomplete information. Bayesian Nash equilibrium. First price auction.

7. Dynamic games of incomplete information. Perfect Bayesian equilibrium. Role of beliefs.
8. Signalling games. Insurance. Labor market.
9. Strategic complements and strategic substitutes. Supermodular games.
10. Games on networks. Definitions. Examples.
11. Games on networks in applied studies. Rebel groups in Africa.
12. Revisiting coordination game. Global games.
13. Global games in applications. Bank runs. Currency crises.
14. Higher order beliefs. Public value of private information.
15. Role of common knowledge. Rubinstein's mailing game.
16. Limitations, misinterpretations and rhetoric of game theory.

Reading list

For the first part of the course:

- Binmore, K. (2007) Playing for Real: A Text on Game Theory. Oxford University Press.
- Fudenberg, D. and J. Tirole (1991) Game Theory. Massachusets Institute of Technology.

Relevant research papers for the second part will be suggested during the course.