Game Theory and Strategy

Department: Economics

Instructor: Prof. Raquel Fernández

Course Number: V31.0215

Frequency: The course will be offered annually beginning in the Spring 2011 semester.

Points and pre-requisites: The course will carry four points. The prerequisites for this course are Economic Principles II (V31.0002) and Calculus I (V63.0121). The lectures will focus mainly on conceptual material and applications.

Properties: The course will meet two times each week for one hour and fifteen minutes each. No unusual audio-visual or technological aids will be used.

A. SYLLABUS

Course description and Aims

This course serves as an introduction to game theory as the study of incentives and strategic behavior in collective and inter-dependent decision making. The course will develop the necessary theoretical tools for the study of game theory, while concurrently introducing applications in areas such as bargaining, competition, auction theory and strategic voting.

This is a course indicated for any student with interest in learning how to apply game theoretical analysis to a variety of disciplines. The aim of the course is to provide a mostly applied overview of game theoretical concepts and emphasize their use in real world situations. By the end of the course, the student should have developed tools which will allow her/him to formally analyze outcomes in strategic situations.

Course materials and Resources

Main Required Textbook:


Course Requirements

There will be one midterm and one final exam and approximately 8 problem sets for this class. The midterm and final exam scores count for 30%, and 60% respectively, of your course grade. The problem set score will be calculated ignoring your lowest score during the semester and will count for 10% of the final grade.
Schedule

DSR: Dixit, Skeath and Reiley  (2009)

Introduction and General Principles of Game Theory

- DSR, chapters 1 and 2
- Some examples of strategic games
- Background and terminology

Simultaneous Games and Nash Equilibrium

- Prisoners’ Dilemma and its applications: DSR, chapter 4, section 4.3
- Pure strategy Nash Equilibrium: DSR, chapter 4
- Multiple Nash equilibria and equilibrium selection: DSR, chapter 4, section 4.7
- Applications:

Mixed Strategies

- DSR, chapter 7
- Nash Equilibrium as a system of beliefs and responses
- How to use mixed strategies in practice
- Probability and expected utility
- Applications: Liar's Poker, Electoral Strategy, Art Sales, World Cup Game
  - World Cup Game Theory. Slate, June 24, 2006.
Repeated Games

- DSR, chapter 11
- Prisoners’ Dilemma as a repeated game and its solution
- Experimental evidence
- Applications: Labor arbitration, Price matching

Collective Action and Collective Inaction Games

- DSR, chapter 12
- Social Norms
- Externalities
- Applications: Tragedy of the commons

Sequential Move Games

- DSR, chapter 3
- Applications: Tic-Tac-Toe and Chess

Simultaneous and Sequential-moves combined: Subgame Perfect Nash Equilibrium (SPNE)

- DSR, chapter 6
- Subgame Perfection and strategic moves: DSR, chapter 10
- SPNE and bargaining: DSR, chapter 18
- Applications: greenhouse emissions

**Games with incomplete information**

- DSR, chapter 9
- Moral hazard and adverse selection
- Signaling games
- Cheap talk
- *Applications:*
  - The last resort: The American government’s bail-outs are less arbitrary than they appear. The Economist, September 18, 2008

**Auctions**

- DSR, chapter 17
- *Applications:*

**Strategy and voting**

- DSR, chapter 16
- *Application:*
B. INFORMATION ABOUT THE COURSE IN THE CURRICULUM OF CAS

No course will be dropped to make way for this one.

C. STATEMENT BY THE DIRECTOR OF UNDERGRADUATE STUDIES

In the interests of providing more challenging courses for students not necessarily majoring in economics, the addition of the Fernandez course on game theory is an excellent & long delayed addition to the offerings at the 200 level. One of the major developments in economic theory post WW II is game theory, so that we were seriously deficient in not offering on a broader basis, an intuitive introduction to game theory. The Department already covers game theory in a formal mathematically rigorous format.

GAME THEORY AND STRATEGY

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