

# Syllabus

## 1. Course Description

- a. Title of the Course: Advanced Game Theory and Topics in Microeconomic Theory (MA-level)
- b. Pre-requisites: Calculus, Microeconomic Theory
- c. Course Type: Elective
- d. Abstract: We will study non-cooperative and cooperative game theory, with emphasis on applications to microeconomic theory and industrial organization. The principal textbook is Gibbons (see below), but we will also follow articles while studying applications.

## 2. Learning Objectives

The goal of the course is to provide students with the knowledge and techniques of game theory, and show them how to use game theory as a toolbox to understand various topics in economics, in particular in microeconomics and industrial organization.

## 3. Learning Outcomes

By the end of this course, it is expected that the student will be able to: 1) understand the main concepts in game theory; 2) recognize strategic situations and represent them as games; 3) solve simple games using various techniques; 4) analyze various economic situations using game theoretical techniques.

## 4. Course Plan

### A. Non-cooperative game theory

#### I. Complete information

- 1. Normal-form games
  - a. Elimination of dominated strategies
  - b. Nash equilibrium
  - c. Mixed strategies and existence of Nash equilibrium
  - d. Applications to oligopoly games

#### 2. Extensive-form representation

- a. Subgame perfect equilibrium
- b. Sequential equilibrium
- c. Various applications to dynamic games
  - i. Dynamic oligopoly games
  - ii. Sequential bargaining games
  - iii. Other IO applications (time permitting)

II. Incomplete information

1. Bayesian-Nash equilibrium
2. Applications:
  - a. Oligopoly games with asymmetric information
  - b. Auctions
3. Perfect Bayesian equilibrium
4. Refinements of PBE
5. Applications to signaling and communication games
  - a. Beer-quiche game
  - b. Spence job-market signaling game
  - c. Cheap talk games
  - d. Games of verifiable information disclosure
  - e. Product certification

B. Cooperative game theory

I. Coalitional games

1. The core
2. Shapley value

II. Matching problems

1. Assignment problem
2. Marriage problem

5. Reading List

a. Main textbook:

Gibbons, Robert: *Game Theory for Applied Economists*, Princeton University Press, 1992  
[International version: *A Primer in Game Theory*, Harvester-Wheatsheaf]

b. Optional textbooks:

Fudenberg, Drew, and Jean Tirole: *Game Theory*, MIT Press, 1992

Mas-Colell, Andreu, Whinston, Michael, and Jerry Green: *Microeconomic Theory*, Oxford University Press, 1995

Myerson, Roger: *Game Theory: Analysis of Conflict*, Harvard University Press, 1991

Osborne, Martin, and Ariel Rubinstein: *A Course in Game Theory*, MIT Press, 1994

6. Grading System

There will be an in-class midterm exam (counting for 30% of the final course grade) and an in-class final exam (counting for 40% of the final course grade). There will be two graded homeworks/projects throughout the semester. Each will count for 10% of the final course grade. I

expect attendance and participation in the lectures. This will count for 10% of the final course grade.

**7. Guidelines for Knowledge Assessment**

A deep understanding of the topics covered in lectures, the assigned readings, and assigned problems is essential for success in the exams and in the course.

**8. Methods of Instruction**

We will rely on formal economic modeling and will use microeconomic tools in the course. It is important that you be familiar with these tools and models.

**9. Special Equipment and Software Support (if required)**