EC941 Game Theory: Spring 2018

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Teaching Assistant:	James Massey

Brief Description.[1] This course covers the fundamentals of Game Theory. We aim to endow the students with the capability to formally analyze strategic interactions in Economics, Business, and Politics. This course requires extensive use of calculus and formal mathematical arguments.

The first part of the course covers complete information games in strategic form. We introduce basic solution concepts such as pure-strategy Nash equilibrium and Rationalizability, and apply them to analyze a number of problems in industrial organization and political economy. Next, we introduce and study mixed-strategy Nash and correlated equilibrium.

The second part of the course covers Bayesian games, to provide the tools for the analysis of incomplete information games. We study the Bayesian Nash Equilibrium in many economic applications.

The third part of the course covers games in extensive form and repeated games, so as to introduce dynamic aspects to the analysis. After developing the solution concept of subgame perfect equilibrium and perfect Bayesian equilibrium, we apply these techniques to a number of problems.

We finally turn to the study of bargaining, which we consider both axiomatically and strategically.

Mathematical Prerequisites. The emphasis of this course is on developing intuition. That said, the examination will test your ability to solve problems that are related to the material from lectures. You should be comfortable with basic calculus; for example, you should be competent using techniques of differentiation. Some basic probability and statistics will also be helpful.

Course Structure. There will be one 2-hour lecture every week, taking place on Tuesday (11:00). In addition, every week you will have seminars with James Massey, who is the Teaching Assistant for this course. There will be a two-hour final exam in the spring term (100% weight).

Core Readings. The main textbook for this course is "An Introduction to Game Theory" by Martin J. Osborne, Oxford University Press, 2003. Another useful book is "Game Theory, An Introduction" by Steven Tadelis, Princeton University Press, 2013. Some other classical references (advanced, graduate-level) are "Game Theory", by D. Fudenberg and J. Tirole, and "Game Theory: Analysis of Conflict", by R. Myerson.

Lecture 1: Games in Strategic Form

Basic definitions. Solution Concepts: Nash Equilibrium, Dominance, and Rationalizability. Applications: Cournot Oligopoly, Bertrand Duopoly, Downsian Electoral Competition, Vickrey Second Price Auction.

Readings: Chapters 2, 3, and 12.

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[1]We are very grateful to Francesco Squintani who put a lot of effort into the previous iteration of this course and kindly permitted us to use his course materials.

Lecture 2: Mixed Strategies

Basic definitions. Nash Equilibrium and Rationalizability. Correlated Equilibrium
  Readings: Chapter 4.

Lecture 3: Bayesian Games

Basic definitions. Information and Bayesian Games. Cournot Duopoly and Public Good Provision with Private information.
  Readings: Chapter 9, sections 9.1 to 9.6

Lecture 4: Bayesian Game Applications

Juries and Information Aggregation. Auctions with Private Information.
  Readings: Chapter 9, sections 9.7 to 9.8.

Lecture 5: Extensive-Form Games with Perfect Information

Basic definitions. Subgame Perfection and Backward Induction. Applications: Stackelberg Duopoly and Harris-Vickers Race
  Readings: Chapters 5, 6, and 7.

Lecture 6: Extensive-Form Games with Imperfect Information

Definitions. Spence Signalling Game. Crawford-Sobel Cheap Talk Game
  Readings: Chapter 10.

Lecture 7: Repeated Games

Infinitely repeated games. Nash and Subgame-Perfect Equilibrium. Finitely Repeated Games.
  Readings: Chapters 14 and 15.

Lecture 8: Bargaining

Ultimatum Game and Hold-up Problem. Rubinstein Alternating Offer Bargaining. Nash Axiomatic Bargaining.
  Readings: Chapter 6, section 6.2 and Chapter 16.

Lecture 9: Review Session

Basic definitions. Subgame Perfection and Backward Induction. Applications: Stackelberg Duopoly and Harris-Vickers Race
  Readings: Lecture notes, Chapters 1–17.