Introduction to Game Theory and Strategic Thinking
[Econ 3801, Fall 2018]
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Course outline

This course is an introduction to game theory and the art of strategic decision-making. A modicum of game-theory is essential in today's age of complex diplomacy and strategizing. Important ideas and concepts, with real-life illustrations, will be discussed in this course, with minimal use of algebra. It is designed for students with an interest in economics, politics, analytical philosophy and also corporate strategy.

Game theory began as a somewhat exotic discipline, with mathematicians analyzing board games from Chess to Hex, but soon it became clear that it applies to all situations where interactive decision-making is involved and where your well-being depends not just on what you do but what others do. In brief, it was soon evident that this is germane to modern economics and also other social sciences. The subject saw a burst of research from the mid-twentieth century and by the end of the twentieth century it had become an essential tool of analysis for economists, financial strategists and also researchers in diplomacy and, in more recent times, in some branches of psychology and behavioral economics.

In these lectures the student will learn the essential ideas of von Neumann, Nash, Schelling and several contemporary game theorists and economists, and how these ideas apply to real-life situations, such as competition among private corporations, war and diplomacy, as in the Cuban missile crisis, and also in understanding every day phenomena, such as addiction and procrastination. While parts of game theory are mathematically demanding, game theory is one of those disciplines where some of its most important ideas can be conveyed with no mathematics but simple deductive reasoning and logic. In this course a lot of the material will be covered with no mathematics but in small parts school algebra and elementary differential calculus will be used. Students will be taught all the important concepts of mainstream game theory, from normal-form to extensive-form games, and ideas of equilibrium, from Nash and subgame perfection to evolutionary stability. Students will learn how to pose new research questions, and to try and solve some open paradoxes of the discipline.

Within this full course, the first five lectures will be devoted to a completely non-technical introduction to the discipline with numerous everyday applications. These initial lectures reflect the fact that a minimal amount of game theory is a useful life skill. To handle problems in real life, from office politics to depression, we often pop pills and rush to counselors. While such measures are no doubt needed in some situations, there are also many everyday contexts where all we really need is clear-headed reasoning to lift the cloud, feel good and succeed. 'Reasoning with oneself' is one of the most under-utilized life-skills. Since game theory is about reasoning in interactive situations—from war and diplomacy and corporate conflict, to everyday decision-making for individual happiness or career success, it is a good way to learn how to reason with yourself. And even apart from this, doing some game-theory and trying to solve some of its puzzles is for the mind what jogging is for the body. It may not be directly productive but it trains the mind to do directly productive activities better, just like jogging trains you to undertake physically productive activities better. The five-lecture introductory segment within the course will be done keeping this self-help aspect in mind.

The two books from which some selected chapters and sections will be used are
  Kaushik Basu: **Prelude to Political Economy** (Oxford University Press, 2000)
  Prajit Dutta: **Strategies and Games** (MIT Press, 1999)

In addition to these, some papers and chapters from other books will be used, which will be made available on the course blackboard. A detailed description of the lectures will be available at the start of the semester and occasionally updated through the semester.

Logistical information

Here are some important dates and information concerning grading.

Students will be evaluated on a total of 100 points, distributed as follows:

Two take-home problem sets (5 points each)

Two preliminary exams in class (15 points each)

      The first preliminary will be in class on 13 September

            [This exam will be based on the first two weeks of class material, which will give students a sense of how well they are coping with the course.]

      The second preliminary will be in class on October 23.

A final, end-of-semester Exam (60 points): On 14 December.

Throughout the semester students will be given take-home problem sets (approximately one a week). Two of them will be part of the final grade, as explained above. It will be specified in advance which two problem sets will count towards the final grade. The rest will be for the students' personal use and learning.

The teaching assistants for this course are Pengfei Zhang (Franco) and Haokun Sun (Sam). Here are their office hours.

Haokun (Sam): Tuesday and Thursday 11.30 – 1 pm. Uris Hall 410.

Pengfei (Franco): Wed and Friday 1 – 2.30 pm. Uris Hall 451.

Students taking this course will be welcome to meet with Pengfei and Haokun to discuss the take-home exams and problems they encounter in class or with the readings.

My office hours will be: Wed 3.30 to 5. Uris Hall 422.

The Opening Lectures

What follows is a brief description of the topics to be covered in the first four or five lectures. These initial lectures will give a glimpse of how we can use game-theoretic reasoning in a variety of settings.

Game Theory and the power of strategic thinking: History and parlor games

      The rise of game theory transformed the way economics is taught and practiced and also contributed to the art of diplomatic thinking. The first lecture will provide a history of game theory and some comments on the personalities involved in it, and also on how to analyze parlor games, such as chess, Hex, and Sudoku.

The Nash Equilibrium and some classic games

      The idea of Nash equilibrium with illustrations from the Prisoner's Dilemma, the Battle of the Sexes, and the Assurance Game will be introduced. The concept of Focal Point, as developed by Thomas Schelling, and its many applications will be described.

The Cuban Missile Crisis

      Using game theory to understand defense and military strategy has a long history. This lecture will present the Cuban missile crisis of 1962 through game-theoretic lenses, the Hawk-Dove game and why, at times, it pays to appear irrational.

Repeated games, backward induction and philosophical paradoxes

      The repeated Prisoner's Dilemma, paradoxes of backward Induction, and the Traveler's Dilemma will be introduced. Some philosophical paradoxes of game theory will be presented and students will be encouraged to try to solve them.

Social norms, political power and extensive-form games

      An introduction will be given to some big topics in psychology and sociology that will be picked up in greater detail in later lectures.