

**POLS 606 (601): Game Theory**  
Professor Ahmer Tarar  
Spring 2006  
Monday 1-3:50 p.m., 2064 Allen Building

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**Purpose:** Game theory is a set of mathematical tools used to study multi-player interdependent decision making (often called *strategic* decision making). Strategic decision-making is used in situations where the outcome depends on the actions of more than one actor, and hence each actor, in choosing his or her optimal course of action, must take into account the expected behavior of the other actors. Such situations arise in all areas of politics, from legislators considering what legislation to introduce and how to vote on it (keeping in mind how they expect other legislators to vote, and whether or not the president will veto it in the US case), to candidates for political office deciding which policy positions to choose (keeping in mind how they expect voters to vote based on their policy preferences), and nations deciding whether or not to attack other nations (keeping in mind how their own and the other side's allies will react). Because analyzing such situations can become extremely complicated, verbal reasoning can easily lead to mistakes and the use of mathematics becomes very helpful.

The purpose of this course is to give students an introductory but solid exposure to the main topics in noncooperative game theory. (Game theory has two branches, cooperative and noncooperative. Cooperative game theory is used to study strategic decision-making when the actors are allowed to make binding agreements to take certain actions; noncooperative game theory is used to study situations where the actors can't, and the actors always choose their actions according to their preferences. The latter is used much more extensively than the former in political science, and in economics as well, and hence we will concentrate on it.) I anticipate that many of the students taking this course do not plan to do advanced modeling in their own research, but want to be able to understand the game-theoretic political science literature. To this end, the course will emphasize the ideas and concepts of game theory rather than the mathematical details. However, the course will also be rigorous enough that students who decided that they want to develop advanced game-theoretic models in their own research will have a firm foundation for pursuing that goal.

**Course Requirements:** Game theory can only be learnt by solving problems. Even if you think you understand everything in lecture, you will realize that you don't once you try solving game theory problems. Therefore, there will be weekly (or semi-weekly) homework assignments that will usually be due a week after they are assigned. There will also be a midterm exam and a final exam, which may or may not be take-home exams (I will announce this later).

## **Readings:**

The only required textbook is Martin J. Osborne's *An Introduction to Game Theory* (2004, Oxford University Press). The book is really nice for a game theory text because it is very explanatory and yet uses rigorous definitions. It also has tons of examples, including many from political science, which is rare for a game theory text.

There are a number of other game theory texts that students may find useful. *Game Theory for Applied Economists* (by Robert Gibbons, 1992, Princeton University Press) does an excellent job of very clearly explaining the solution concepts for different types of games. I highly recommend it. *A Course in Game Theory* (by Osborne and Rubinstein, 1994, MIT Press) is an advanced graduate-level text that uses most of the same notation as our text. It is quite advanced and rigorous, and I highly recommend it for any student who wants to seriously pursue advanced game theory. (I might occasionally prove some results from this text in class.) The same goes for *Game Theory* (by Fudenberg and Tirole, 1991, MIT Press), another very advanced and especially comprehensive text. Finally, for students who want a very basic yet engaging introduction to game theory, there is *Thinking Strategically* (by Dixit and Nalebuff, 1991, Norton).

## **Students With Disabilities Policy:**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Room 126 of the Koldus Building, or call 845-1637.

## **Course Materials/Copyright Statement:**

The handouts used in this course are copyrighted. By "handouts," I mean all materials generated for this class, which include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials review sheets, and additional problem sets. Because these are copyrighted, you do not have the right to copy the handouts, unless I expressly grant permission.

## **Plagiarism Statement:**

As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writings, etc., which belong to another. In accordance with the definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of the person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated. If you have any questions regarding plagiarism,

please consult the latest issue of the Texas A&M University Student Rules, under the section "Scholastic Dishonesty."

**Tentative Course Schedule:**

The following is an outline of the order in which we will cover topics. It is subject to change during the course of the semester. We may or may not get to some of the special topics.

**Topic 1:** Mathematical Preliminaries, and Introduction to Game Theory and the Theory of Rational Choice: Ch. 17, 1

**Topic 2:** Strategic Form Games: Nash Equilibrium: Ch. 2, 3 (parts)

**Topic 3:** Strategic Form Games: Mixed Strategy Equilibrium, Strictly Competitive Games, Rationalizability: Ch. 4, 11, 12

**Topic 4:** Bayesian Games: Ch. 9

**Topic 5:** Extensive Form Games with Perfect Information: Ch. 5, 6 (parts), 7 (parts)

**Topic 6:** Extensive Form Games with Imperfect Information: Ch. 10

**Topic 7:** Repeated Games: Ch. 14, 15

**Special Topic 1:** Evolutionary Equilibrium: Ch. 13

**Special Topic 2:** Bargaining: Ch. 16 and Baron and Ferejohn 1989 APSR "Bargaining in Legislatures" article

**Special Topic 3:** Social Choice Theory

**Special Topic 4:** Coalitional Games and the Core: Ch. 8