Syllabus for GOVT 7073: Game Theory 1, Fall 2015

Instructor: Andrew Little, 301 White Hall, andrew.little@cornell.edu
Location: Tuesday/Thursday 1:25-2:40, Uris Hall G22
Office Hours: By Appointment

This is the first in a two course sequence that introduces graduate students in political science (and related fields) to game theory, a tool for studying strategic interaction that is now used throughout the discipline. In the first course, students will learn the basic concepts of game theory and how to solve most of types of games used in applied political science work. The main aim is to prepare students to be good "consumers" of game-theoretic work in the substantive areas they work on, with a secondary goal of preparing students to think about writing their own models. The second course, taught in the Spring, will cover more advanced topics with more of a focus on producing original game-theoretic work.

A Note on Math

Game theory is a mathematical discipline. However, this is not a math class, and we will spend much more time going through concrete examples of how game theory has been applied to political science than proving general theorems. While some game-theoretic work uses quite advanced math, a fair amount of applied work requires only high school algebra, and most can be done with the addition of some basic probability and multivariate calculus. I will only assume knowledge of algebra, and any probability and calculus used will be taught/reviewed as we go along.

Math is hard and frustrating at times for everyone. I know that some of you may have not taken math in a long time or did not come to political science graduate school to take math(y) classes. A few suggestions if you are nervous about this aspect of the class:

- Stay on top of the readings, and consult multiple texts if you are having a hard time (more on this below)
- Start problem sets early, even if this just means scanning the problems to get your thoughts percolating
- Most importantly: DO NOT BE EMBARRASSED TO ASK YOUR COLLEAGUES OR ME FOR HELP. Again, EVERYONE struggles with some of this material, so there

is no shame in admitting you are confused. Much of the material in the class is cumulative, so it is important to clear up any issues early lest you enter the spiral described here:
http://mathwithbaddrawings.com/2013/04/25/were-all-bad-at-math-1-i-feel-stupid-too/

General Policies

Texts

There are countless introductory game theory textbooks, and even more opinions on the best individual or set of books to use for a class like this. These vary on their level of technicality, focus on political science, and clarity of writing. I think the one that best suits are purposes and hence will serve as the main text is:

- Martin J. Osborne, "An Introduction to Game Theory"

Still, when studying game theory (and other technical topics), it is often extremely useful to consult more than one source. For simplicity I will primarily work off Osborne and won't require any additional text, but I strongly recommend you acquire at least one of these based on your needs. If you are uncomfortable with the technical aspects of the course, you should try reading the corresponding section in this text before Osborne:

- Avinash Dixit, Susan Skeath, and David H. Reiley Jr., "Games of Strategy"

Another good book at a similar level as Osborne (and at times a bit clearer) but more economics focused is:

- Robert Gibbons, "Game Theory for Applied Economists"

If you book must be written by Political Scientists, try:

- Nolan McCarty and Adam Meirowitz, "Political Game Theory"

For those who want a more detailed and technical treatment, a good (free!) choice is:

- Martin J. Osborne and Ariel Rubinstein, "A Course in Game Theory"

Two other popular sources among Game Theorists are

- Roger Myerson, "Game Theory"
- Drew Fudenberg and Jean Tirole, "Game Theory"

The list could go on; ask me, others, or the internet if none seem to suit your needs.

Evaluation

- Class Participation: 10%. While this is mostly a lecture class, it should be relatively interactive: I expect to be interruputed a lot, and will often have the class break into groups to work on problems together. So, regular attendance and participation will be necessary to do well.

- Problem Sets: 50%. See below for details. Problem sets will be given out most weeks either at the end of class on Thursday or Friday morning at the latest. The problem sets are due either (1) by 4:29pm the day before the next class as a hard copy in my mailbox (2nd floor of White Hall), or (2) by 11:59pm the day before the next class if written up electronically and emailed to me. (Note the incentive to write-up electronically!)

- Final Exam: 20%. I usually give a 48 hour take-home exam starting the last day of class, though the exact format will be negotiable.

- Final Paper: 20%. The paper will akin to a proposal for a model that could be a part of a research paper (about 5 pages). Alternatively, if you incorporate a model into a seminar paper for another class that will count as well, provided you have permission from the other instructor.

Problem Sets and Collaboration

Half of your grade for the class will come from the nearly-weekly problem sets. Still, please do not forget that what you learn from doing the problem sets is far more important than your grades. To be blunt, rote copying of an answer from your colleagues or other sources is a waste of your time and the grader's time.

That said, I strongly encourage you to work together on the problem sets. Collaboration benefits both the receivers of help as well as the givers: being able to explain something to others is one of the best ways to truly master it. Three important guidelines for collaboration:

1. You should always spend some time trying to figure out the problems on your own before turning to others. This is both to keep a check on how well you understand the material, and because the initial stages of trying to crack a problem on your own are an important – if hard! – way on the path to understanding.

2. Your solution must be written in your own words. Again, copying is a waste of everyone's time.

3. If your solution to a problem comes from one of your colleagues – and this is more than fine as long as you follow guidelines 1 and 2 – acknowledge them in your write up. For example "Joe M provided the general approach to solving part a"

Schedule

Each "week" below will roughly correspond to two classes. The exact pace of the class is endogenous: comprehending what we do cover will be prioritized over getting through everything.

Week 1: Introduction; Why do Game Theory; Preferences, Choice, and Utility

Ben Orlin, "What it Feels Like to Be Bad at Math"

Osborne Chapter 1

R. Harrison Wagner, "Who's Afraid of 'Rational Choice Theory" (don't mind the IR theory stuff if you aren't into that kind of thing; pay particular attention to pages 7-9)

Phil Arena: Rational Choice Apologetics, pts i-iii

Week 2: Strategic Games with finite actions, Nash Equilibrium

Osborne 2.1-2.7

Week 3: Nash Equilibrium continued; Dominated Actions and Best Response Functions; Continuous Strategies without Calculus

Osborne 2.8-2.9 (skip example 39.1, section 2.8.4); 3.3-3.4

Week 4: Continuous Strategies with (Some) Calculus

Osborne 17.1-17.3; example 39.1; section 2.8.4; rest of chapter 3

Week 5: Mixed Strategies

Osborne 4.1-4.4

Week 6: Sequential Moves pt 1

Osborne ch 5

Week 7: Sequential Moves pt 2

Osborne 6.1, 6.3; 7.1, 7.3, 7.7, 16.1

Week 8: Repeated Games

Osborne Ch 14

Week 9: Repeated Games pt 2

Osborne Ch 15

Week 10: Simultaneous Games with Incomplete Information

Osborne Ch 9

Weeks 11-12: Extensive Games with Incomplete Information (Signaling, Screening, Cheap Talk and Career Concerns if time permits)

Osborne Ch 10

Week 13: Overflow; Game Theory and Political Science, revisited; Testing Game Theoretic Models?

Ariel Rubinstein, "How game theory will solve the problems of the Euro Bloc and stop Iranian nukes"

Clarke, Kevin A., and David M. Primo. 2007. "Modernizing Political Science: A Model-Based Approach." Perspectives on Politics 5, 4:741-753.