

POLS W4732
Research Topics in Game Theory
FALL 2016
This version (subject to changes): August 15, 2016

Instructor: Carlo Prato, 702 IAB, email: cp2928@columbia.edu.

Teaching Assistant: Giovanna Invernizzi, email: gmi2105@columbia.edu.

Time and Location: MW, 4:10 pm - 5:25 pm, TBD.

Office Hours:

C. Prato	Wed	08:30-10:00	702 IAB
G. Invernizzi	TBA	TBA	

Discussion Section: The teaching assistant will conduct regular sections, which will focus on problem sets, applications, and student's questions.

Short description. Advanced topics in game theory will cover the study of repeated games, games of incomplete information and principal-agent models with applications in the fields of voting, bargaining, lobbying and conflict. (Time permitting, Results from the study of social choice theory, mechanism design and auction theory will also be treated.) The course will concentrate on mathematical techniques for constructing and solving games. The goals of this course are: (i) improving familiarity with the formal analysis of strategic interaction and (ii) developing the ability to put these techniques to the service of a research project in quantitative social sciences.

Prerequisites: Students are expected to have completed a basic course in game theory, such as POLS W4730, as a prerequisite for enrollment. More generally, students should be familiar (working knowledge) with some foundational mathematics including sets and relations, basic calculus, and basic probability theory.

Textbooks: There is no official textbook for the course. Lecture slides will be made available following the given lecture, and constitute the primary material. Whenever available, I will also provide references to academic articles on which certain lecture might be based. There are also a few more comprehensive references that I recommend for those interested in pursuing formal theoretical work. First, a number of game theory texts cover substantial portions of the material in the first part of the course. Perhaps the most comprehensive are

- Martin J. Osborne. 2004. *An Introduction to Game Theory*. Oxford: Oxford University Press.
- Fudenberg, Drew, and Jean Tirole, 1991. *Game Theory*. Cambridge, MA: MIT Press.

Additional useful resources that overlap and expand on topics covered in the second part of the course are:

- Austen-Smith, David and Banks, *Positive Political Theory II*, 2005 Ann Arbor, MI: University of Michigan Press
- Persson, Torsten and Guido Tabellini, 2000. *Political Economics*, MIT Press

Grading: Students will be evaluated as follows: 7 Problem Sets (8% of final grade each), a midterm and a final exam (22% of the final grade each).

Description of the Course

General information about written papers or assignments. The purpose of written assignments is to develop skills in understanding and communicating research ideas. The assignments are an exercise in learning and in reporting what you have learned. There is a lot of truth in the statement *if you can't explain it, you don't understand it*.

Problem Sets. There will be 7 problem sets. Problem sets will be posted online and due at the beginning of the relevant TA section. Because working problems is critical to fulfilling the learning goals, these problem

sets will constitute 56% of your grade. You are encouraged to work on problem sets in groups. Each student must, however **write up her/his own answers**. Late problem sets will not be accepted. All problem sets must be **written clearly** or even better, typed. We expect that the reasoning behind each answer will be laid out in an easy-to-follow string of logic. That is, the TA and professor should not have to work hard to figure out what it is you are arguing. This will almost certainly mean that, once a student arrives at an answer, she/he will have to rewrite them.

Midterm and Final. Midterm (**Oct 24**) and Final (**Dec 12**) be in-class, and will each account for 22% of your final grade.

Class time. Class time will be mostly frontal instruction, often complemented by directed discussion. The main purpose of the lecture is to present and elaborate on the material, which to someone will be advanced. As a consequence, **attendance is extremely important**.

Outline. Below, you will find an outline for the class. Needless to say, it is often the case that the pace of instruction ends up adjusting compared to the instructor's initial expectations, so the outline below is subject to change.

Outline

Week	Topic
0	Introduction
1	Refresher on basic formalism and static games TA Session, PS 1
2	Repeated games: the Folk Theorem, with application to conflict TA Session on applications
3	Bargaining - the Baron-Ferejohn and Rubenstein models TA Session, PS 2
4	Bayesian Games with applications TA Session on applications
5	Sigaling TA Session, PS 3
6	Cheap Talk and Persuasion TA Session on applications
7	Midterm, Supermodularity TA Session on midterm solutions
8	Principal-agent models TA Session, PS 4
9	Models of career concern TA Session, PS 5
10	Electoral Competition I TA Session on applications
11	Electoral Competition II, the citizen-candidate model
12	Lobbying and contests TA Session, PS 6
13	Dynamic games and Markov perfection TA Session, PS 7
14	Final Exam