PA 795: Game Theory for Public Policy and Administration

University of Kentucky
Martin School of Public Policy and Administration
Fall 2015
12:30-1:45-PM Mon/Wed
Miller Hall 101

Instructor: Keith E. Schnakenberg
Email: keith.schnakenberg@gmail.com
Web: http://keith-schnakenberg.com/
Office Hours: Thursday 4-5
POT 429

This course provides an introduction to non-cooperative game theory and its application to research in public policy and administration. Students will learn how to represent static and dynamic games under complete and incomplete information and how to analyze them using appropriate methods and solution concepts. Applications to public policy and administration are emphasized as much as possible but the primary focus will be on gaining a solid foundation in game theory.

The required textbook is *Game Theory: An Introduction* by Steven Tadelis. This is a good middle-of-the-road game theory text which provides enough precision to prepare you to use game theory in some realistic applications but stopping short of the most technical books that may be appropriate for a more advanced course. For students who desire a slightly gentler (i.e. less mathematical) introduction to game theory I suggest Martin Osborne's (2004) *An Introduction to Game Theory.* Students who crave a more advanced reference should consider Osborne and Rubinstein's *A Course in Game Theory*, Roger Myerson's *Game Theory: Analysis of Conflict,* or Fudenberg and Tirole's *Game Theory,* which are all fantastic but very technical. Osborne and Rubinstein's book has the added virtue of being free. I recommend these books as references only after you have completed this course.

I assume that students have a working knowledge of algebra, elementary calculus, and basic probability theory. For students who require a refresher on one or more of these topics, I recommend Simon and Blume's (1994) *Mathematics for Economists* or Moore and Siegel's (2013) *A Mathematics Course for Political and Social Research*.

Grades and Requirements

The course grade will be determined as follows:

- Problem sets (approximately weekly): 50
- Exams:
  - Exam 1: 25%
  - Exam 2: 25%

- The problem sets will help students to understand the core theoretical concepts and develop the ability to solve games.
  - I have not found a way to learn game theory that works as well as solving a lot of games, so the problem sets will be frequent and challenging.
  - Students may work together on problem sets but must each turn in separate assignments. Working together means discussing solutions and methods. It does not mean splitting up the problems or copying solutions from another students.
  - I strongly recommend that students typeset all problems in the LaTeX typesetting program: as a practical matter, familiarizing yourself with a scientific typesetting system is a a research skill that will make it much easier for you to actually conduct game theoretic or otherwise mathematical research. I will put some helpful LaTeX help files on the course website.
- There will be two in-class exams, the timing of which will depend on how quickly we move through the material. The exams will be similar to the problem sets except that they must be completed in class without collaboration or reference materials.

COURSE TOPICS

A list of topics and associated course readings are below. Students may choose whether to read the chapters before or after lectures.

- Individual rationality and representation of normal-form games
  - Readings: Tadelis, Chapters 1-3
- Strategic forms games and Nash equilibrium
  - Readings: Tadelis, Chapters 4-5
- Mixed strategy Nash equilibria
  - Readings: Tadelis, Chapter 6
- Extensive form games and subgame perfect Nash equilibrium
  - Readings: Tadelis, Chapters 7-9
- Repeated games
  - Readings: Tadelis, Chapter 10
- Bargaining
  - Readings: Tadelis, Chapter 11
- FIRST EXAM

- Static games of incomplete information, Bayes Nash equilibrium
  - Readings: Tadelis, Chapter 12
- Auctions
  - Readings: Tadelis, Chapter 13
- Mechanism design
  - Readings: Tadelis, Chapter 14
- Dynamic games of incomplete information, perfect Bayesian and sequential equilibrium
  - Readings: Tadelis, Chapter 15
- Signaling games
  - Readings: Tadelis, Chapter 16
- Cheap talk
  - Readings: Tadelis, Chapter 17
- Bonus topics (time permitting)
  - Delegation and principal-agent games
  - Reputation
  - Experiments and quantal response equilibrium
- SECOND EXAM

COURSE POLICIES

ATTENDANCE POLICY

I do not take attendance, though as a practical matter you will probably fail this course if you do not attend. Attendance is required on days that include in-class activities such as an exam.

EXCUSED ABSENCES

Students need to notify the professor of absences prior to class when possible. S.R. 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit "reasonable cause for nonattendance" by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Information regarding dates of major religious holidays

may be obtained through the religious liaison, Mr. Jake Karnes (859-257-2754).

Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused or unexcused) per university policy.

VERIFICATION OF ABSENCES

Students may be asked to verify their absences in order for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request "appropriate verification" when students claim an excused absence because of illness or death in the family. Appropriate notification of absences due to university-related trips is required prior to the absence.

ACADEMIC INTEGRITY

Per university policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the university may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website:
`http://www.uky.edu/Ombud.`
A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Part II of Student Rights and Responsibilities, available online at
`http://www.uky.edu/StudentAffairs/Code/part2.html`
states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about the question of plagiarism involving their own work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording or anything else from another source without appropriate acknowledgement of the fact, the students are guilty of plagiarism. Plagiarism includes reproducing someone elseâĂŹs work, whether it be a published article, chapter of a book, a paper from a friend or some file, or something similar to this. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work which a student submits as his/her own, whoever that other person may be.

Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone. When a studentâĂŹs assignment involves research in outside sources of information, the student must carefully acknowledge exactly what, where and how he/she employed them. If the words of someone else are

used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas which are so generally and freely circulated as to be a part of the public domain (Section 6.3.1).

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

ACCOMMODATIONS DUE TO DISABILITY

If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, email address: `jkarnes@email.uky.edu`) for coordination of campus disability services available to students with disabilities.