SYLLABUS

MEETING TIMES AND VENUE
TBA

OVERVIEW
This course is designed to provide a thorough introduction to non-cooperative game theory for political science PhD students. The objective of the course is to cover the basic concepts of non-cooperative game theory rigorously while allowing plenty of time to discuss applications in many different fields of political science. All of this takes a lot of time and there is much to cover, so we will be holding 2 hours & 50 minutes of lecture per week. The course will not cover social choice theory or cooperative game theory.

PREREQUISITES
Statistics (Poli 783) or equivalent.
**Textbooks**

**Required:** There are two required textbooks for the course, both of which I find to be excellent. It is highly recommended that you follow along in both of them as the course progresses:


Gibbons provides less political science examples and solved exercise than Osborne, but is more formal and precise in the classification of different games and equilibrium concepts. It is not mathematically demanding and user friendly to students who do not have a technical mathematical background.

The outline of the first the course roughly follows the order of material in both Osborne and Gibbons although lectures will contain topics which require additional readings.

**Recommended:** You may wish to consult other game theory texts, in particular those listed below. Which of these additional texts is best suited to your needs should be a function of your background knowledge and how much you hope to do with game theory.

  This text is somewhat more analytically demanding than Gibbons’. It provides a much more detailed discussion of some of the more advanced topics, e.g. equilibrium refinements in extensive-form games of incomplete information, which makes it an excellent companion to such a text, although it is a comprehensive introduction in its own right.

  This book presents the most systematic and nuanced, but mathematically unsparing, treatment of the subject. It is the best textbook for people who are very comfortable with mathematical tools.
**COURSE REQUIREMENTS**

You will be graded in this course on the basis of several factors.

- First, there will be one midterm exam and one final exam which will constitute 70% of your grade (30% and 40% respectively). These are cumulative and will test concepts you should have learned from the assigned readings and the lectures.

- In addition, bi-weekly homework assignments will typically be handed out every other Thursday, and will be due on the following Wednesday at 12pm. Students are required to work in small groups composed of 2-3 students and to submit a single homework. Every week a group will be randomly selected (on Wednesday after having collected all the groups’ homeworks) and one of the students belonging to the group will solve part of the weekly assignment in the class the day after. The material in a game theory course is cumulative, and it is extremely important not to fall behind. Because of this, late homework sets will simply not be accepted. Homework will consist of 30% of the course grade and will be calculated based on your highest n-1 scores out of the n problem sets (the lowest score is dropped).

Summing up, grades will be computed on the following basis:
- Homework assignments 30%
- Midterm exam 30%
- Final exam 40%

**CLASSROOM ATTENDANCE**

Class attendance is mandatory and part of a student’s grade. Absences may be excused only in the case of documented serious illness, family emergency, religious observance, or civic obligation. If you will miss class for religious observance or civic obligation, you must inform your instructor no later than the first week of class.

**MAKEUPS**

Make-up exams will not be available for students who fail to notify your instructor in advance of missing an examination, nor for students without an acceptable explanation. If you have a valid reason for a makeup exam, inform your instructor as ap. A valid reason is a medical emergency, a death or serious illness in the family, and, quite frankly, very little else. In all cases, you will be expected to bring in proof.
A fundamental tenet of all educational institutions is academic honesty; academic work depends upon respect for and acknowledgment of the work and ideas of others. Misrepresenting someone else's work as one's own is a serious offense in any academic setting and it will not be condoned.

Academic misconduct includes, but is not limited to, providing or receiving assistance in a manner not authorized by the instructor in the creation of work to be submitted for academic evaluation (e.g. papers, projects, examinations and assessments - whether online or in class); presenting, as one's own, the ideas, words or calculations of another for academic evaluation; doing unauthorized academic work for which another person will receive credit or be evaluated; using unauthorized aids in preparing work for evaluation (e.g. unauthorized formula sheets, unauthorized calculators, unauthorized programs or formulas loaded into your calculator, etc.); and presenting the same or substantially the same papers or projects in two or more courses without the explicit permission of the instructors involved.

A student who knowingly assists another student in committing an act of academic misconduct shall be equally accountable for the violation, and shall be subject to the sanctions and other remedies described in The Student Code. Sanctions shall include, but are not limited to, a letter sent to the Dean of Students of the University; a grade of 0 on the assignment or exam; a grade of F for the course.
WEEK 1-2 (1/13, 20)
Preferences, Choices and Decision Making under uncertainty
- Functions
- The optimization Problem
- Uncertainty and Chance
- Decision making under Uncertainty

Reading Assignments:
- Osborne, ch. 1
- Handouts

WEEK 3-4 (1/27 – 2/3)
Normal Form Games of Complete Information I
- Normal form games with discrete strategy spaces
  - Dominance & Iterated Dominance
  - Nash Equilibrium
  - Best Response Functions
  - Mixed Strategies

Reading Assignments:
- Osborne, ch. 2, 4
- Gibbons, ch. 1

WEEK 5 (2/10)
Normal Form Games of Complete Information II
- Normal form games with continuous strategy spaces
  - Spatial model of electoral competition
  - Median Voter Theorem
  - Other examples from politics

Reading Assignments:
- Osborne, ch. 3
- Gibbons, ch. 1

WEEK 6-7 (2/17, 24)
Extensive Form Games of Complete Information
- Extensive form games with discrete strategy spaces
  - Subgame Perfect Equilibrium
  - Backwards induction
  - “credible threats”
- Extensive form games with continuous strategy spaces
  - examples from politics

Reading Assignments:
- Osborne, ch. 5, 6, 7
- Gibbons, ch. 2.1

**WEEK 8 (3/3): MIDTERM EXAM**

**WEEK 9 (3/17)**

**Bargaining**
- Bargaining as an extensive game

*Reading Assignments:*
- Osborne, ch. 16
- Gibbons, ch. 2.2


**Repeated Games**
- Finitely repeated games
- Infinitely repeated games
- Folk Theorem
- One-shot deviation principle

*Reading Assignments:*
- Osborne, ch. 14-15
- Gibbons, ch. 2.3

**WEEK 12 (4/7)**

**Normal Form Games of Incomplete Information**
- Bayesian Nash equilibrium
- Beliefs and Types
- Examples from politics

*Reading Assignments:*
- Osborne, ch. 9
- Gibbons, ch. 3

**WEEK 13-14 (4/14, 21)**

**Extensive Form Games of Incomplete Information**
- Perfect Bayesian equilibrium
- Examples with discrete strategy spaces
- Examples with continuous strategy spaces
Reading Assignments:
- Osborne, ch. 10
- Gibbons, ch.4.1