

# PL SC 506: INTRODUCTION TO GAME THEORY

Professor Sona N. Golder

Teaching Assistant: Eleanor Schiff

## **Course information:**

Class Time: Thursday 9.30 - 12.30 a.m.

Place: 112 Osmond Lab

## **Contact Information for Professor**

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Office Hours: 2.00 - 3.00 pm Wednesday or by appointment.

## **Contact Information for Teaching Assistant**

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Office: 314 Pond Lab

Office Hours: 9:15 - 11:15 am Monday.

## **Course Description**

Over the past few decades the use of formal theoretical methods has become widespread within political science. Broadly defined these methods include game theory, behavioral game theory (in connection with laboratory experiments), social choice theory, and computational methods. This course focuses on the first of these methods. Specifically, it is a formal introduction to non-cooperative game theory in political science.

Learning how to use formal theory as an integrated part of your research is, in many respects, like acquiring a new language. By the end of this semester, you will have acquired some of the tools necessary to begin using game theory in developing your own research ideas. At a minimum, you should be able to read and have a deeper understanding of some of the important theoretical contributions in your field of interest.

## **Required Texts**

We will primarily read out of Martin Osborne's introductory game theory text. Any other readings will be available on the web or on the course ANGEL site.

Osborne, Martin J. 2004. *An Introduction to Game Theory*. USA: Oxford University Press.

## **Class Meetings**

We will typically meet once a week, and these meetings will be divided into two sessions. I will introduce new material in one of the sessions and we will work problems associated with the previous week's material during the other. Each of you will lead at least two problem sessions. I assume that you will come to lectures prepared to discuss new material.

## **Grading**

Your final grade is a weighted average of the following components:

- Problem sets most weeks (assigned Thursday, due by noon Tuesday in TA's mailbox, 203 Pond) (30%).
- Two Open-Book, Take-Home Examinations (Each worth 30% of your grade).
- Problem Session Leadership and Participation (10%).

Final course letter grades will be assigned based upon the following scale:

A: 93.0+ | A-: 90 - 92 | B+: 87 - 89 | B: 83 - 86 | B-: 80 - 82 | C+: 77 - 79 | C: 70 - 76 | D: 60 - 69 | F: Less than 60

### **Academic Dishonesty**

The Department of Political Science, along with the College of the Liberal Arts and the University, takes violations of academic dishonesty seriously. Observing basic honesty in one's work, words, ideas, and actions is a principle to which all members of the community are required to subscribe.

All course work by students is to be done on an individual basis unless an instructor clearly states that an alternative is acceptable. Any reference materials used in the preparation of any assignment must be explicitly cited. Students uncertain about proper citation are responsible for checking with their instructor.

In an examination setting, unless the instructor gives explicit prior instructions to the contrary, whether the examination is in class or take home, violations of academic integrity shall consist but are not limited to any attempt to receive assistance from written or printed aids, or from any person or papers or electronic devices, or of any attempt to give assistance, whether the one so doing has completed his or her own work or not.

Lying to the instructor or purposely misleading any Penn State administrator shall also constitute a violation of academic integrity.

In cases of any violation of academic integrity it is the policy of the Department of Political Science to follow procedures established by the College of the Liberal Arts. More information on academic integrity and procedures followed for violation can be found at: [http://www.la.psu.edu/CLA-Academic\\_Integrity/integrity.shtml](http://www.la.psu.edu/CLA-Academic_Integrity/integrity.shtml)

### **Disabilities**

Penn State welcomes students with disabilities into the University's educational programs. If you have a disability-related need for reasonable academic adjustments in this course, contact the Office for Disability Services. For further information regarding policies, rights and responsibilities please visit the Office for Disability Services (ODS) Web site at: [www.equity.psu.edu/ods/](http://www.equity.psu.edu/ods/). Instructors should be notified as early in the semester as possible regarding the need for reasonable accommodations.

## **PART I. STRATEGIC GAMES (NORMAL FORM)**

**August 28** – No class (Instructor at APSA).

**September 4** – Course introduction. Actions, Preferences, and Payoff Functions.

- Read chapter 1.

**September 11** – Nash equilibrium I.

- Read 2.1 - 2.7.

**September 18** – Nash equilibrium II: Best response functions, Dominated Actions, Symmetric Equilibria.

- Read 2.8 - 2.10 and 3.3.
- Problem session leader: Chen

**September 25** – Randomization: vNM Preferences, Mixed Strategy Nash Equilibrium.

- Read 4.1 - 4.3; 4.6; 4.8; 4.10.
- Recommended: A. K. Dixit & S. Skeath 2004, *Games of Strategy*, Chapter 5.
- Recommended: J. D. Morrow (1994), *Game Theory for Political Scientists*, pp. 81-88.
- Problem session leader: Crabtree

## PART II: EXTENSIVE FORM GAMES

**October 2** - Backward Induction and Subgame Perfection.

- Read Chapter 5; 6.3.
- Problem session leader: Joo

**October 9** – Simultaneous and chance moves.

- Read 7.1; 7.3 - 7.4; 7.6 - 7.7.
- Problem session leader: Semat

**October 16** – Problem session, no lecture. Midterm exam available.

- Problem session leader: Song

**October 23** – No class. Midterm Exam due.

## PART III. EXTENSIONS

**October 30** – Repeated Games: Nash Equilibria.

- Read 14.1 - 14.8.
- Read J. Morrow 1994, *Game Theory for Political Scientists*, Chapter 9.

**November 6** – Repeated Games: Subgame Perfect Nash Equilibria.

- Read 14.9 - 14.12.
- Problem session leader: Akanvou

**November 13** – Incomplete Information Games (Bayesian Games) I.

- Read 9.1 - 9.3, 9.5, and 9.7.
- Problem session leader: Fernandez

**November 20** – Incomplete Information Games (Bayesian Games) II.

- Read 10.1 - 10.5.
- Problem session leader: Regmi

*Thanksgiving Week Break, November 24 - 28*

**December 4** – Finite Bargaining Games.

- Read 6.1 and 16.1.
- Read J. Morrow 1994, *Game Theory for Political Scientists*, pp. 145-156.
- Problem session leader: Instructor/volunteer

**December 11** – Problem session. Final exam available.

- Problem session leader: Instructor/volunteer

**December 17** – Exam 2 due.