

# PLSC 29102/30901

## Game Theory I

### Winter 2021

**Instructors:** Professor Scott Gehlbach, [gehlbach@uchicago.edu](mailto:gehlbach@uchicago.edu)

**Teaching assistant:** Lingnan He, [lingnan@uchicago.edu](mailto:lingnan@uchicago.edu)

**Class time:** Monday, 1:30–4:20

**Office hours:** TBD

## Course description

This course, and Game Theory II which follows in the winter quarter, constitute a two-quarter sequence in game theory: the mathematical analysis of strategic decision making. The bulk of both courses is organized around classes of “games,” that is, representations of strategic environments. For each class of games we will develop and learn to use one or more “solution concepts,” that is, methods of deriving predictions. When possible, we will appeal to applications from political science. That said, the concepts are general, and social scientists from neighboring disciplines should find the course accessible and useful.

Class meets weekly for nearly three hours. The first two hours will be lecture, to be led by Professor Gehlbach. Lingnan will devote the remaining time to discussion and coverage of related topics, such as how to use  $\text{\LaTeX}$ —a document processing system you will use for your solutions to problem sets.

## Course requirements

There are four components to the course grade:

- Midterm exam: 35 percent
- Final exam: 50 percent
- Problem sets: 15 percent

Problem sets will be distributed every Monday that class meets but the last. They are due the next time that class meets. Grading of the problem sets will be “coarse,” with each problem set given a check plus (exemplary effort), check (complete/good effort), check minus (incomplete/poor effort), or zero (not turned in). Despite the coarseness, and notwithstanding the small direct contribution to your final grade, by far the most important thing you can do in this course is to give yourself heart, body, and soul to the problem sets. Do not be tempted into easing back for a problem set or two, with the thought that you can catch up before the exam. This material is like a train: if you get off at one station, you will find it very difficult to get back on at the next. Do work in groups, but ideally only after you have already attempted to solve the problems on your own; the final writeup should be your own. Please see me and your teaching assistant when you have questions.

You are also encouraged to attend either Professor Gehlbach or Lingnan's office hours, where you will have an opportunity to work through issue you and others might encounter on the problem sets.

## Reading

In contrast to many topics in political science, game theory is best taught from a textbook. The primary text for the course is:

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

You may also find the following text valuable (below I provide relevant readings in brackets):

McCarty, Nolan and Adam Meirowitz. 2007. *Political Game Theory: An Introduction*. Cambridge: Cambridge University Press.

Additional readings are listed below and will be made available through Canvas.

## Special accommodations

The University of Chicago, and I personally, support the right of all enrolled students to a full and equal educational opportunity. The University's policies regarding students with disabilities are available [here](#). If you have a disability accommodation awarded by the University Student Disability Services Office, please let me know as soon as possible so that we coordinate accommodations.

## Diversity and inclusion

We learn from each other. A diverse classroom encourages us to see the world from new perspectives. To take full advantage of this resource, we must maintain an environment of open inquiry in which all are able to participate. It is our commitment as instructors to foster this environment.

You can find the University's statement on civil behavior in a university setting [here](#).

## Support

Academic life during a pandemic poses numerous challenges. If you are feeling overwhelmed and/or depressed, you are not alone. We urge you to attend to your mental health. All services of the Student Counseling Service (SCS) are fully covered by the Student Life Fee. If you are seeking new services or resources, please call 773-702-9800 during business hours (Monday—Friday, 8:30 am–5:00 pm) and ask to speak with a clinician. If you need urgent

mental-health care, you can speak with a clinician 24/7 by calling the SCS at 773-702-3625. More information is available [here](#).

Beyond SCS, the University provides numerous other forms of support for online learning. Please peruse the available options [here](#).

## Academic integrity

You are a student at the University of Chicago. As such, you have assumed responsibility to uphold the highest standards of academic integrity and honesty. Among other things, this means that you will not represent another's work as your own or otherwise gain unfair academic advantage. We will report any plagiarism, cheating, or other form of academic dishonesty to the dean of students. We reserve the right to impose sanctions beyond those imposed by the dean, including a grade of zero on the assignment in question; this could result in a failing grade for the course.

## COVID-19

We will need to be nimble to handle whatever this pandemic throws our way. If Lingnan or I need to quarantine, we will teach over Zoom. If you need to quarantine, you may join the class by Zoom. In all other cases you should attend class in person.

## Use of online resources

Online resources are for course use only. More concretely, by enrolling in this course, you acknowledge that:

- You will not (i) record, share, or disseminate University of Chicago course sessions, videos, transcripts, audio, or chats; (ii) retain such materials after the end of the course; or (iii) use such materials for any purpose other than in connection with participation in the course.
- You will not share links to University of Chicago course sessions with any persons not authorized to be in the course session. Sharing course materials with persons authorized to be in the relevant course is permitted. Syllabi, handouts, slides, and other documents may be shared at the discretion of the instructor.
- Course recordings, content, and materials may be covered by copyrights held by the University, the instructor, or third parties. Any unauthorized use of such recordings or course materials may violate such copyrights.
- Any violation of this policy will be referred to your dean of students.

## Readings and course schedule

Readings are given in *chapter.section.subsection* format.

## **I Individual and Social Choice**

### **September 27—Individual Choice, and a Bit of Social Choice**

[McCarty and Meirowitz 2, 4]

## **II Strategic Games with Perfect Information**

### **October 4—Nash Equilibrium**

Osborne 2

[McCarty and Meirowitz 5.1, 5.2.2, 5.6]

### **October 11—Applications: Electoral Competition, the Commons Problem**

Osborne 3.3

Dutta, Prajit K. 1999. *Strategies and Games: Theory and Practice*. Cambridge, MA: MIT Press. Chapter 7.

[McCarty and Meirowitz 5.3]

### **October 18—Mixed-Strategy Nash Equilibrium**

Osborne 4.1-4.5, 4.7-4.10, 4.12

[McCarty and Meirowitz 5.4, 5.13]

### **October 25—Rationalizability and Iterated Dominance**

Review Osborne 2.9, 4.4

Osborne 12

[McCarty and Meirowitz 5.2.1, 5.5]

### **November 1—MIDTERM EXAM (in class)**

## **III Extensive Games with Perfect Information**

### **November 8—Subgame-Perfect Nash Equilibrium**

Osborne 5, 7.1

[McCarty and Meirowitz 7.1, 7.3, 7.5]

### **November 15—Application: Repeated Games**

Osborne 14, 15

[McCarty and Meirowitz 9]

**November 22—THANKSGIVING BREAK**

**November 29—Application: Bargaining Models**

Osborne 16.1

[McCarty and Meierowitz 10.2–10.4]