Political Science 505

Theories of Individual and Collective Choice I

Fall 2022

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Assistant Instructor: Zion Little

Washington University
Department of Political Science
Thursdays 4-6pm
Seigle 210

OVERVIEW

This course provides an introduction to non-cooperative game theory and its application to research in political science. 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 political science are emphasized as much as possible but the primary focus will be on gaining a solid foundation in game theory. The course will be conducted primarily in lecture format.

LOGISTICS

Classes take place on Thursdays, 4-6pm, in Seigle 239. Office hours will be on Wednesdays from 3-5pm, and by appointment.

The assistant instructor, Zion Little (l.zion@wustl.edu), will also hold office hours, the timing is tbd. He will hold sections on Fridays, 10-10:50am, in Seigle 205. Sections will cover additional examples, problem sets, student questions and, occasionally, supplementary topics.

COURSE MATERIALS

There is no required textbook for this class, but I highly recommend that you acquire a textbook that is adequate for your technical background and use it to follow up on each week's class topics. The lecture is most closely modeled after the following book:

- Tadelis, Steven. *Game Theory. An Introduction.*

This is a good medium level option in terms of technical difficulty. The draft schedule below indicates the relevant chapters for each class but it will not be difficult to match class topics to chapters

for any other game theory book. A less technical option well suited for students with a limited mathematical background is:

- Osborne, Martin J. *An Introduction to Game Theory.*

More advanced options include:

- McCarty, Nolan, and Adam Meirowitz. *Political Game Theory.*
- Gibbons, Robert. *Game Theory for Applied Economists.*
- Fudenberg, Drew, and Jean Tirole. *Game Theory.*

To follow the material in this class, students will need knowledge of algebra, elementary calculus and basic probability theory. Most of the game theory books mentioned above have appendices that cover some of the required mathematical tools, but students who need a refresher on these topics may also find the following books helpful:

- Simon, Carl P., and Lawrence Blume. *Mathematics for Economists.*
- Moore, Will H., and David A. Siegel. *A Mathematics Course for Political and Social Research.*

Lecture notes will be made available on the course's Canvas page immediately after each lecture. All other materials including problem sets and an updated version of this syllabus will also be available online. Occasionally, the slides or schedule below will point to additional materials. Whenever these are not available in the public domain, they will also be added to Canvas.

REQUIREMENTS

Students will be evaluated based on the following:

- Problem sets (approximately weekly): 60%
- Final exam: 40%

Problem sets. The problem sets will reinforce the material covered in class. They are meant to help students learn how to solve games through practice – which, in my experience, is the most effective way to learn it.

- Students are free to collaborate with others on problem sets, but each student should write up his or her own solutions.
- You should typeset your solutions in LaTeX. If you are not familiar with LaTeX, now is an excellent time to learn, since knowing how to use LaTeXwill be an asset throughout your time in graduate school (and beyond).
- Your solution should indicate the students with whom you collaborated in solving the problems.
- I strongly encourage you to take a look at the problems by yourself and think about how you would approach them before discussing strategies and solutions with others. Doing so will help you figure out what you already know, and where you may have to ask others or take an approach that is different from what you had initially thought.

Final exam. The exam takes place during finals week and will be similar to the problem sets.

SCHEDULE

This schedule is approximate and subject to change depending on how we progress.

- **September 1:** Introduction & Individual Decision-making
  - Tadelis Chapters 1 & 2
  - Keith Schnakenberg's single person decision-theory overview (more advanced)
- **September 8:** Static Games of Complete Information
  - Tadelis Chapters 3 & 4
- **September 15:** Static Games of Complete Information
  - Tadelis Chapters 5 & 6
- **September 22:** Static Games of Complete Information
  - Tadelis Chapters 5 & 6
- **September 29:** Dynamic Games of Complete Information
  - Tadelis Chapters 7 & 8
- **October 6:** Dynamic Games of Complete Information
  - Tadelis Chapters 7 & 8
- **October 13:** Finitely Repeated Games
  - Tadelis Chapters 9 & 10.1
- **October 20:** Infinitely Repeated Games
  - Tadelis Chapter 10
- **October 27 (On Zoom):** Infinitely Repeated Games
  - Tadelis Chapter 11
- **November 3:** Static Games of Incomplete Information
  - Tadelis Chapter 12
- **November 10:** Static Games of Incomplete Information
  - Tadelis Chapter 12
- **November 17:** Dynamic Games of Incomplete Information
  - Tadelis Chapters 15 & 16
- **November 24:** *Thanksgiving break*
- **December 1:** Dynamic Games of Incomplete Information
  - Tadelis Chapters 15 & 16
- **December 8:** Dynamic Games of Incomplete Information
  - Tadelis Chapters 15 & 16