

**POL478H1/POL2578 L0101:
Topics in Methods—Introduction to Game Theory**

Winter term, Mondays 10:00-12:00 in UC148
Prof. Mark S. Manger

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Office hours: Tuesdays, 1:00-3:00pm

- Overview:** This course is an introduction to game theory: the mathematical analysis of strategic decision-making. Most of the course is organized around classes of “games” (representations of strategic environments) and “solution concepts” (methods of deriving predictions). Although the material is inevitably abstract, when possible we will incorporate applications from political science. We will not avoid technical detail, but the course deals with “tools,” not epistemology or critique. Along the way, we will also review some mathematical foundations, e.g. how to write proofs, how we get from preferences to utility functions, and basic elements of individual and social choice theory. Little beyond high-school mathematics but a lot of hard thinking is required.
- Objectives:** To acquire the necessary skills to read game-theoretic papers in political science and related disciplines that use complete information models, and to learn how to develop and solve such models for application in original research.
- Prerequisites:** High-school algebra, including at least a vague recollection of what a derivative of a function is and what it does. One term of calculus is recommended.
- Teaching method:** Weekly two-hour lecture by the instructor, the solving of problem sets by the students, and additional reading and independent study by students as required.
- Assignments and Grade Breakdown:**
- Five **problem sets** (20% each) posted on Blackboard by the instructor and due the following week in class. As solutions will be posted on Blackboard by the instructor after the due date, no late submission can be accepted. If you have a *documented* medical or family emergency, you can choose to have a make-up problem set at a later date or to have the one of your problem sets that is closest to your average grade on the problem sets to be given 30% weight. Due dates for the problem sets are January 26, February 2, February 9, March 9, March 30.
 - All assignments are to be handed in to the instructor in class on the due dates. Electronic submissions are not sufficient, although you may submit your answers by email in addition to the hardcopy. I recommend that you use the typesetting language Latex to type your answers.

Readings: The **required** textbook is Watson, Joel. 2013. *Strategy: An Introduction to Game Theory*. Third Edition. New York, NY: W. W. Norton & Company. It has been ordered at the UofT bookstore. Earlier editions are not suitable.

If the explanations in Watson's book don't "work" for you, this book might be a good companion:

Gibbons, Robert. 1992. *Game Theory for Applied Economists*. Princeton, NJ: Princeton University Press.

In addition, if you are serious about game theory, you'll probably end up buying one or more of these books.

Fudenberg, Drew, and Jean Tirole. 1991. *Game Theory*. Cambridge, MA: MIT Press. A bit terse and a tough read even after taking this course, but a standard reference.

Myerson, Roger B. 1991. *Game Theory: Analysis of Conflict*. Cambridge, MA: Harvard University Press. Very clear and great for self-study.

Osborne, Martin J., and Ariel Rubinstein. 1994. *A Course in Game Theory*. Cambridge, MA: MIT Press. Also very good, unlike the other books covers some cooperative game theory, but at times unusual notation.

Blackboard: Problem sets and solutions will be posted on Blackboard, so you are expected to check the course pages every week.

Plagiarism: Plagiarism is a most serious academic offense and the offender will be punished.

Auditing the course: Graduate students may be allowed to audit the course at the instructors discretion and space permitting. However you are expected to do all assignments and check solutions yourself, otherwise the learning effect will be negligible.

Contacting the instructor: Office hours are listed above. If you cannot make those, please ask for an alternative appointment by e-mail. If you feel that you do not understand something that was covered in class, my office hours are an opportunity to get further explanation, but I obviously cannot discuss the problem sets before they are handed in.

Schedule of Topics—the pace will be adjusted as needed but the due dates for the assignments are fixed.

Session 1 (January 5): Introduction to the course and review

In this session, we will review essential probability theory, set theory, and optimization without constraints. If you miss this class, you should really only take the course if you have a firm grasp of these topics.

Martin, Christopher Flynn et al. 2014. "Chimpanzee Choice Rates in Competitive Games Match Equilibrium Game Theory Predictions." *Scientific Reports* 4. <http://www.nature.com/srep/2014/140605/srep05182/full/srep05182.html> (June 9, 2014).

Session 2 (January 12): Choice-Theoretic Foundations and Representation of Games

Watson, Chapters 1-3

Session 3 (January 19): Beliefs and Mixed Strategies

Watson, Chapters 4-5

Session 4 (January 26): Static Settings—Best Response and Rationalizability

Watson, Chapters 6-8

Session 5 (Feb 2): Equilibrium Concepts I

Watson, Chapters 9-10

Session 6 (Feb 9): Equilibrium Concepts II

Watson, Chapters 11-12

Session 7 (Feb 23): Contract, Law and Enforcement

Watson, Chapter 13

Session 8 (Mar 2): Extensive form, backward induction, and subgame perfection

Watson, Chapters 14-15

Session 9 (Mar 9): Examples and Applications

Watson, Chapters 16-17

Session 10 (Mar 16): Bargaining

Watson, Chapters 18-19

Session 11 (Mar 23): Negotiation equilibrium

Watson, Chapters 20-21

Session 12 (Mar 30): Repeated Games and Applications

Watson, Chapters 22-23

