

Economics 212: Game Theory

Spring 2016

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Class Time and Place: Tuesdays and Thursdays 10:30 a.m.-noon, Annenberg 111

This course is about strategically interdependent decisions. In such situations, the outcome of your actions depends also on the actions of others. When making your choice, you have to think what the others will choose, who in turn are thinking what you will be choosing, and so on. As social scientists, we focus on human interaction, and we shall assume that people behave in a rational, deliberate manner. Game theory offers several concepts and insights for understanding such situations, and for making better strategic choices. We study the theory and some of its applications to economics.

Prerequisites:

Econ 101 (Intermediate Micro) and Math 114, 115, or 116 (Multivariate Calculus), in a *previous* semester. For Wharton students, the (calculus-based) honors version of BEPP 250 can be used to fulfill the Econ 101 prerequisite. The regular BEPP 250 course does not count as a substitute for Econ 101. This policy does not apply to students who do not have a Wharton affiliation.

In this course, I plan to emphasize conceptual analysis rather than technical arguments. Yet this still implies that the course is substantially more advanced and abstract than other undergraduate classes; after all, game theory is a branch of mathematics. Accordingly, you should feel comfortable with the standard mathematical notation and abstract reasoning.

Indeed, one of the goals of this lecture is to change the way you think. So what will be important is not merely recording the answers but understanding the reasoning process by which you reach them.

Main Texts:

Required: Watson, J., *Strategy: An Introduction to Game Theory (3rd Edition)*

Recommended: Harrington Jr. J.E., *Games, Strategies, and Decision Making*

Watson is mathematically more rigorous but, nevertheless, easy to read. You will be responsible to the material appears in it. Harrington is chattier but offers more examples and applications, which you might find useful.

Grading:

Six problem sets will be assigned. They will be graded on a coarse scale (0-2). *No late submission*. You are encouraged to work in groups, but write down your solutions individually. When computing your course grade, your lowest problem set score will be dropped. (So you can, for any reason, miss one problem set.) **Problem set completion counts for 10% of your course grade.**

There will be two (non-cumulative) in-class midterms and a (comprehensive) final exam. All exams are closed book, notes, calculators, and mobile phones. **Each exam counts for 30% of the course grade.** The midterms will be held on February 11 and on March 31. The final will be held on May 4, from noon-2 p.m.. If you are unable to take one of the midterms *for a compelling reason*, the other midterm and the final exam each will count for 45% of your course grade. To determine whether or not your case is valid for missing an exam, I will follow the department policy for the final exam, which can be found in the link below. According to the department policy, examples of reasons that are **not valid** for missing an exam include (but not all): job interviews; job internships; beginning fall or spring break early or returning after a scheduled exam; and end of semester early flights. Note also that the department policy says “Do not take an exam if you are ill and then expect to have an opportunity to retake the exam because you were ill the first time and did poorly.”

Students have two weeks from the day in which examinations are returned to report errors in grading and/or to request that problems be re-graded. If a student submits his/her exam for re-grading, the student’s entire exam will be re-graded (with no guarantee of a higher total score). Also, if the submitted exam is different from the original one (we will make a copy of randomly selected bluebooks), we will report it to the registrar office.

Here is a link to the department course policies:

<http://economics.sas.upenn.edu/undergraduate-program/course-information/guidelines/policies>

Course Outline:

(1) Representing Games

Lecture 1 (January 14):

Strategic Interaction, Utility, Preference.

Lecture 2 (January 19):

Extensive-Form Games, Normal-Form Games.

Lecture 3 (January 21):
Dominance, Best Response.
Problem set 1 will be posted.

(2) Static Games with Complete Information

Lecture 4 (January 26):
Iterated Dominance, Rationalizability.

Lecture 5 (January 28):
Nash Equilibrium in Two-Player Games.
Problem set 1 will be due by the beginning of the class.
Problem set 2 will be posted.

Lecture 6 (February 2):
Market Games: Cournot, Bertrand, Minimum-Price Guarantee.

Lecture 7 (February 4):
Nash Equilibrium in N -Player Games, Competitive Limit.
Problem set 2 will be due by the beginning of the class.

Lecture 8 (February 9):
Review.

Lecture 9 (February 11):
First Midterm.

Lecture 10 (February 16):
In-Class Experiments.

Lecture 11 (February 18):
Mixed-Strategy Equilibrium.

Lecture 12 (February 23):
Empirical Works, Existence of Nash Equilibrium.

Lecture 13 (February 25):
Common Knowledge, Evolutionary Game Theory.
Problem set 3 will be posted.

(3) Dynamic Games with Complete Information

Lecture 14 (March 1):
Backward Induction.

Lecture 15 (March 3):
Zermelo's Theorem, Subgame-Perfect Equilibrium.
Problem set 3 will be due by the beginning of the class.
Problem set 4 will be posted.

Lecture 16 (March 15):
Commitment Effects.

Lecture 17 (March 17):

Bargaining.

Problem set 4 will be due by the beginning of the class.

Problem set 5 will be posted.

Lecture 18 (March 22):

Repeated Games.

Lecture 19 (March 24):

More on Repeated Games.

Problem set 5 will be due by the beginning of the class.

Lecture 20 (March 29):

Review.

Lecture 21 (March 31):

Second Midterm.

(4) Games with Incomplete Information

Lecture 22 (April 5):

Bayesian Nash Equilibrium, Market for Lemons.

Lecture 23 (April 7):

Auctions.

Problem set 6 will be posted.

Lecture 24 (April 12):

More on Auctions.

Lecture 25 (April 14):

Signaling.

Problem set 6 will be due by the beginning of the class.

Lecture 26 (April 19):

More on Signaling.

Lecture 27 (April 21):

Review.

Lecture 28 (April 26):

No class.