

Economics 212: Game Theory

Spring 2015

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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.

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:

Seven problem sets will be assigned. They will be graded on a coarse scale (1-3). *No late submission*. You are encouraged to work in groups, but write down your solutions individually. When computing your course grade, your two lowest problem set scores will be dropped. (So you can, for any reason, miss up to two problem sets.) **Problem set completion counts for 10% of your course grade.**

There will be two (non-cumulative) in-class midterms and a (comprehensive) final exam. **Each exam counts for 30% of the course grade.** The midterms will be held on February 17 and on April 7. The final will be held on May 8. If you are unable to take one of the midterms *for an excused reason*, the other midterm and the final exam each will count for 45% of your course grade. All exams are closed book, notes, calculators, and mobile phones.

Fine Print:

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 15):

Strategic Interaction, Utility, Preference.

Lecture 2 (January 20):

Extensive-Form Games, Normal-Form Games.

Lecture 3 (January 22):

Dominance, Best Response.

Problem set 1 will be posted.

(2) Static Games with Complete Information

Lecture 4 (January 27):

Iterated Dominance, Rationalizability.

Lecture 5 (January 29):

Economic Applications of ID.

Problem set 1 will be due by the beginning of the class.

Problem set 2 will be posted.

Lecture 6 (February 3):

Nash Equilibrium in Two-Player Games.

Lecture 7 (February 5):

Market Games: Cournot, Bertrand, Minimum-Price Guarantee.

Problem set 2 will be due by the beginning of the class.

Problem set 3 will be posted.

Lecture 8 (February 10):

Nash Equilibrium in N -Player Games, Competitive Limit.

Lecture 9 (February 12):

Review.

Problem set 3 will be due by the beginning of the class.

Lecture 10 (February 17):

First Midterm.

Lecture 11 (February 19):

In-Class Experiments.

Lecture 12 (February 24):

Mixed-Strategy Equilibrium.

Lecture 13 (February 26):

Empirical Works, Existence of Nash Equilibrium.

Problem set 4 will be posted.

(3) Dynamic Games with Complete Information

Lecture 14 (March 3):

Backward Induction.

Lecture 15 (March 5):

No class.

Lecture 16 (March 17):

Zermelo's Theorem, Subgame-Perfect Equilibrium.

Lecture 17 (March 19):

Commitment Effects.

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

Problem set 5 will be posted.

Lecture 18 (March 24):

Bargaining.

Lecture 19 (March 26):

Repeated Games.

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

Problem set 6 will be posted.

Lecture 20 (March 31):

More on Repeated Games.

Lecture 21 (April 2):

Review.

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

Lecture 22 (April 7):

Second Midterm.

(4) Games with Incomplete Information

Lecture 23 (April 9):

Bayesian Nash Equilibrium, Market for Lemons.

Lecture 24 (April 14):

Auctions.

Lecture 25 (April 16):

More on Auctions.

Problem set 7 will be posted.

Lecture 26 (April 21):

Signaling.

Lecture 27 (April 23):

More on Signaling.

Problem set 7 will be due by the beginning of the class.

Lecture 28 (April 28):

Review.