Economics 682: Game Theory and Applications
Spring 2017

Instructor: Yuichi Yamamoto, 457 McNeil
Email: yyam@sas.upenn.edu
Office Hours: Tuesdays 1:30-3:30 p.m., and by appointment

TA: TBA

Class Time and Place: TBA

This course is an introduction to the principles of game theory at a graduate level. Game theory has two parts. First, it is a language to describe a strategic interaction. It formalizes a problem such as: Firm A sets its price, then Firm B sets its price, then customers decide where to buy. Second, game theory proposes solution concepts, which try to predict what rational players would do if they were faced with a specific game. In the example above: Which price should Firm A set? How should Firm B respond to Firm A's price?

The goal of the course is to provide you with sufficient knowledge of game theory to be able to read applied research papers. Also we will discuss why economists have chosen these solution concepts, and what limitations they have.

Prerequisites:
I will assume some familiarities with basic mathematics, e.g., multivariate calculus, analysis, and basic probability theory. No previous economics knowledge is assumed, but intuitions from some undergraduate courses will be helpful.

To undergraduate students: You are welcome to take the class, but please discuss it with me first. (For more detailed information, go to the department website and see "Course Requirements" page for the mathematical economics major.)

Main Texts:
Jehle, G. and P. Reny, *Advanced Microeconomic Theory (3rd Edition)*
Gibbons, R., *Game Theory for Applied Economists*

Supplementary Readings:
Mas-Colell, A., M. Whinston, and J. Green, *Microeconomic Theory*
Fudenberg, D. and J. Tirole, *Game Theory*
Dixit, A. and S. Nalebuff, *Thinking Strategically*

MWG and FT are references for advanced topics. DN is a popular introduction to game theory. None of these books are required.

Grading:
The course will be evaluated on the basis of four problem sets, one in-class midterm exam, and one in-class final exam. The midterm is worth 40% of the grade, and the final 60%. Performance in the problem sets will be taken into account for the tie break grades. The final is cumulative but with the emphasis on on the second half of the course.

Course Outline:

(1) Static Games with Complete Information

Lecture 1:
Strategic Interaction, Normal-Form Games, Utilities.

Lecture 2:
Elimination of Dominated Strategies, Nash Equilibrium for Two-Player Games.

Lecture 3:
Market Games: Monopoly, Cournot, Bertrand, and Minimum-Price Guarantee.

Lecture 4:
Nash Equilibrium for N-Player Games, Competitive Limit.

Lecture 5:
Mixed-Strategy Equilibrium.

Lecture 6:
Empirical Work and Evolutionary Game Theory.

Lecture 7:
Existence of Nash Equilibria.

(2) Dynamic Games with Complete Information

Lecture 8:
Extensive-Form Games, Non-Credible Threats, Backward Induction.

Lecture 9:
Zermelo's Theorem, Subgame-Perfect Equilibrium, War of Attrition.

Lecture 10:
Commitment Effect, Nash Bargaining Solution.

Lecture 11:
Rubinstein-Stahl's Bargaining Model.

Lecture 12:
Repeated Games.

Lecture 13:
More on Repeated Games.

Lecture 14:
Mid-Term Exam.

(3) Static Games with Incomplete Information

Lecture 15:
Bayesian Nash Equilibrium with Independent Types, Harsanyi's Purification.

Lecture 16:
Bayesian Nash Equilibrium with Correlated Types, Rubinstein's Email Game.

Lecture 17:
First-Price Auction, Second-Price Auction.

Lecture 18:
Revenue Equivalence, Efficient Auction.

Lecture 19:
Myerson-Satterthwaite Theorem, Revelation Principle, Groves Mechanism.

(4) Dynamic Games with Incomplete Information

Lecture 20:
Perfect Bayesian Equilibrium, Sequential Equilibrium.

Lecture 21:
Signaling, Intuitive Criterion.

Lecture 22:
Spence's Job Market Signaling.

Lecture 23:
Reputation Effects.

Lecture 24:
Coarse Conjecture.

(5) Contract Theory

Lecture 25:
Moral Hazard.

Lecture 26:
Adverse Selection.

Lecture 27:
Review.