Department of Economics
The Ohio State University
Economics 5001: Game Theory

Syllabus and Course Outline

James Peck   Tuesday, Thursday 11:10 – 12:30
Fall 2017   Arps Hall 012 (basement)
www.econ.ohio-state.edu/jpeck/Econ5001.htm
Office Hours (440 Arps): Tuesdays 2-3, Wednesdays 10-11

Course Objectives: This course provides a rigorous introduction to the field of Game Theory, by presenting the underlying theory and providing illustrative examples.

Course Requirements:

First Midterm Exam (Tuesday, September 19):   25%
Second Midterm Exam (Tuesday, October 24)   25%
Final Exam (Monday, December 11, 12:00 – 1:45 pm):   35%
Homework: 15%

There will be no make up exam for the midterms. Students who have a valid, *pre-approved* excuse for missing a midterm will have the other midterm count for 35% of the grade and the final exam count for 50% of the grade.

Study groups are allowed on the homework assignments, in which you can discuss the questions and talk about how to solve them. However, you need to write up the answers individually and without help. Homework grades are based on full credit for a good faith effort submitted on time, half credit for submitting on time but not providing a minimum good faith effort, and zero credit otherwise.

Students have the option of submitting a short (2-4 pages) extra credit paper that takes a strategic situation in real life or from some other source (movie, TV, etc.), models the situation as a game, and solves the game. The extra credit score will replace the lowest score received for a homework assignment. In addition, for students on the borderline between D+ and C-, extra credit will be given additional weight. Extra credit papers are due on the last day of class.

We will occasionally run some classroom experiments to illustrate the material, using MobLab. Instructions for participating, including downloading the app to your smartphone or tablet will be explained later in the course. Participation is strongly encouraged, but it is optional and it will not be part of the grade.

Textbook: Watson, Joel, "Strategy: An Introduction to Game Theory," W. W. Norton & Company, Third Edition, 2013.

Other texts (not required):

Osborne, Martin J., "An introduction to Game Theory," Oxford University Press, 2004.

Harrington, Joseph E. Jr., "Games, Strategies, and Decision Making," Worth Publishers, 2014.

Course Outline

0. Introduction

Watson, Chapter 1.

I. Defining a Game

A. Extensive Form Games (first pass)

Game trees, information sets, and payoffs. Modeling simultaneity.

Watson, Chapter 2.

B. Normal (Strategic) Form Games

Strategy set, strategy, strategy profile, payoff function, matrix form, relation to the extensive form, examples of normal form games.

Watson, Chapter 3.

C. Mixed Strategies and Expected Payoffs

Beliefs about strategy choices of the other players, mixed strategy, expected payoff.

Watson, Chapter 4.

D. Rationality and Common Knowledge

Interpretation of payoffs as utility, risk aversion and altruism, common knowledge of rationality, bounded rationality.

Watson, Chapter 5.

II. Solving Normal Form Games

A. Dominance and Best Response

Dominated strategy, weakly dominated strategy, dominant strategy, efficient strategy profile, best response, undominated strategies, tension between individual incentives and efficiency.

Watson, Chapter 6.

B. Rationalizability and Iterated Elimination of Dominated Strategies

Iterated dominance, rationalizable strategy, dominance solvable, strategic uncertainty, coordination problem, location game example.

Watson, Chapters 7,8.

C. Nash Equilibrium

Definition of NE, finding NE of matrix games, interpretations of NE, experimental game theory, the example of the Braess paradox.

Watson, Chapter 9.

D. Oligopoly Games and Voting Games

The Cournot model, the Bertrand model, two- and three-candidate platform competition.

Watson, Chapter 10.

E. Mixed-Strategy Nash Equilibrium

Matching pennies example, general definition, calculating the mixed-strategy NE, an oligopoly entry game, Nash's theorem.

Watson, Chapter 11.

III. Extensive Form Games

A. Details of the Extensive Form

Initial node, predecessor nodes, successor nodes, terminal nodes, rules for game trees, perfect and imperfect information, actions and strategies, Nash equilibrium, extensive form NE.

Watson, Chapter 14.

B. Backward Induction and Subgame Perfection

Sequential rationality, backward induction in games of perfect information, subgame perfection, the centipede game, the chain-store game, Stackelberg competition.

Watson, Chapter 15.

C. Repeated Games

Definition of a repeated game, finitely repeated prisoner's dilemma, infinitely repeated prisoner's dilemma, grim trigger strategy, the folk theorem, infinitely repeated chain store game.

Watson, Chapter 22.

IV. Extensive Form Games with Imperfect Information

A. Incomplete Information

Incomplete information vs. imperfect information, types and Bayesian normal form representation, extensive form games with chance moves, Bayesian extensive form representation.

Watson, Chapter 24.

B. Bayesian Nash Equilibrium

Cournot game with cost uncertainty, auctions.

Watson, Chapters 26, 27.

C. Extensive Form Games with Imperfect Information and Sequential Play

Beliefs off the equilibrium path, Perfect Bayesian Equilibrium, the beer and quiche game.

Watson, Chapter 28.

Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct (http://studentaffairs.osu.edu/resource_csc.asp).

Disability Services

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. You are also welcome to register with Student Life Disability Services to establish reasonable accommodations. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.