

Game Theory - Professor Lasheng Yuan (袁曙笙)

Course Description:

This course is an introduction to game theory. Ideas such as repeated games, incomplete information are discussed and applied to games played in class and to examples drawn from economics, politics, the movies, and elsewhere. This course will sharpen your understanding of strategic behavior in encounters with other individuals. You will learn how to recognize and model strategic situations, to predict when and how your actions will influence the decisions of others and to exploit strategic situations for your own benefit. The course aims to provide students with a basic understanding of the language and concepts of game theory, as well as providing some surveys of important theoretical models within the field. Game theory, like any formal theory, relies on Mathematics to make progress and exact statements. When necessary we will review the needed mathematical tools for each topic.

Learning Outcomes:

By the end of this course it is expected that the student will be able to:

1. understand the basic issues;
2. explain how to recognize strategic situations and represent them as games;
3. solve simple games using various techniques;
4. analyses various economic situations using game theoretic techniques;
5. understand, through a basic introduction, the more formal aspects of the theory;
6. predict how other people or organizations behave when they are in strategic settings;
7. apply these tools to settings from economics and from elsewhere.

Textbook(s):

1. Carmichael, Fiona. A Guide to Game Theory, Prentice Hall, 1st edition, 2005.
2. Martin J., Osborne. An Introduction to Game Theory, Oxford University Press, 2004.

Course Outline:

1. Overview Class
2. Decision Theory
 - (a) Utility representations of preferences
 - (b) Probability and expectations
 - (c) von Neumann and Morgenstern expected utility representation
 - (d) "Paradoxes"
3. Game Theory, basics and canonical models
 - (a) Dominance
 - (b) Equilibrium: Pure strategies
 - (c) Equilibrium: Mixed Strategies
 - (d) Basic games: Prisoner's Dilemma, Matching Pennies, Battle of the Sexes, Stag Hunt, Dove-Hawk

(e) Continuous Games: Cournot & Bertrand; Public Goods

4. Extensive-Form Games

- (a) Game trees and information
- (b) Sub-game perfection
- (c) Forgetful driver game
- (d) Stackelberg & other illustrations
- (e) Refinements (maybe)

5. Repeated Games

- (a) Finitely repeated games
- (b) Rubinstein bargaining
- (c) Infinitely repeated games
- (d) Folk theorems

6. Incomplete Information

- (a) Bayesian games
- (b) Auctions
- (c) Signaling
- (d) Voting
- (e) Cheap talk & strategic communication

7. Extensions (If time allows)

- (a) Rationalizability
- (b) Evolutionary Game Theory

Grade Determination and Final Examination Details:

There will be one midterm exam (worth 30%), a final exam (worth 40%), and 5 assignments (worth 30%).

All work will be marked on a numerical basis, then aggregated, and converted to letter grades. The following grade conversion chart is an approximate guide to letter grade equivalents.

A+	96 – 100	B	76 – 80	C-	56 – 60
A	91 – 95	B-	71 – 75	D+	51 – 55
A-	86 – 90	C+	66 – 70	D	46 – 50
B+	81 – 85	C	61 – 65	F	<45

I reserve the right to change the grade conversion chart if, in my opinion, a change is necessary to fairly represent student achievement.

Calculators will not be allowed during the writing of tests and final examinations. There will be a Registrar scheduled final examination, lasting 2 hours and held in a classroom. Tests and exams will not involve multiple choice questions.