

GAME THEORY & BUSINESS

FALL 2022

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Teaching Assistant: TBD

Review Sessions: TBD (weekly)

COURSE CONTENT

Companies (managers, individuals) often make decisions that affect the well-being of others. In turn, our payoff (compensation, well-being) is often affected by the choices made by others. In simpler terms, people often operate in situations of strategic interaction. Game Theory is the discipline that studies strategic interaction. The theory has two inter-related goals:

1. To advise parties involved in situations of strategic interaction on the best course of action.
2. To predict the outcome of strategic interaction.

This course is an introduction to Game Theory. Our goal is to learn the basic conceptual tools from Game Theory and identify some real-life business situations where these tools can be useful to a manager. The games presented and solved in class go to the essence (often in the simplest framework possible) of particular aspects of strategic interaction that arise in real-life situations. To understand the similarities between these simple games and the many situations that arise both in business and in our daily economic lives, the course provides applications of the theory to business and economics.

COURSE STRUCTURE

Classes will combine theory and applications. We will present the concepts required to analyze different forms of strategic interaction. For instance: What do you know when you have to make a decision? Do you observe the choices of your opponents? Do you interact with them repeatedly? Different answers to these questions call for different frames of analysis. We will then apply the theory to business and economic situations. For example, we will study price and quantity competition, endogenous barriers, formation and stability of cartels, and auctions.

READINGS

The course is self-contained but there is an optional recommended textbook: Avinash Dixit and Susan Skeath, *Games of Strategy*, Fifth Edition, New York: WW Norton, 2021.

The fifth edition of the textbook is the latest, but the previous ones, especially the fourth (2015) and the third (2009) are quite similar.

Readings will be made available online, linked from the Canvas course website. These range from news articles to chapters of books. Readings are optional.

Also recommended for lighter reading on business and games is: Avinash Dixit and Barry Nalebuff, *The Art of Strategy*, New York: WW Norton, 2010

PROBLEMS AND ASSIGNMENTS

Optional problems: There is a collection of optional problems on Canvas. The problems follow the progression of the material covered in class. Problems are solved by the TA during the Friday review sessions. Solutions will be posted on Canvas.

Assignments: There are three graded assignments. Students are encouraged to work in groups for the assignments, but the answers must be turned in individually. Assignments are due at the beginning of the class indicated in the course outline. They will be handed out one week before the due date.

GRADING POLICY AND CLASS PARTICIPATION

Grades in the course will be based on the three assignments, a final exam, and class participation:

Final Exam: 50%

Assignments: 30%

Class Participation: 20%

Each student's participation will be evaluated with respect to the contribution that the student makes towards the entire class' learning experience. The quality of contribution matters more than the frequency of speech.

CONTENT

The content of the course is still under development. Here is a preliminary list of topics:

	Complete Info	Incomplete Info
Simultaneous Moves	Topic 1: Thinking About Games Concepts: Dominant strategy, dominance solvability Games: prisoners' dilemma, guessing games, location games	Topic 4: Bayesian Games Concept: player types Games: auctions, trading
	Topic 2: Nash Equilibrium Concepts: reaction function, Nash equilibrium Games: markets, price oligopoly, quantity oligopoly, mergers, meet the competition	
	Topic 3: It's More Complicated Concepts: multiple equilibria, mixed strategies Games: coordination games, penalty kicks, inspections	
Sequential	Topic 5: Sequential Games Concepts: game tree, subgame-perfect equilibrium Games: promises and threats, entry deterrence, bargaining, dynamic pricing	
		Concept: signaling game Games: job market, bluffing

Topic 1 Thinking about Games

What is Game Theory? Aspartame example, definition of game, plan of course

Dominance Solvability: game matrices, prisoners dilemma, dominant action, iterated deletion of dominated strategies, guessing game, location game, median voter theorem

Topic 2 Nash Equilibrium

Nash Equilibrium: reaction function, definition

Application to markets: Price and quantity oligopoly, mergers, meet-the competition clauses, changing the game, quantal response equilibrium

Topic 3 Nash Equilibrium When Things Are More Complicated

Multiple equilibria: coordination games, chicken game, risk dominance

Mixed strategy equilibria: penalty game, general problem, finding mixed strategy equilibrium

Topic 4 Bayesian Games

Auctions: First price, second price, Private values, common values,

Bayesian games: General approach, trading games, and other examples

Topic 5

Sequential Games

Subgame perfect equilibrium: game trees and backward induction: various examples, promises and threats, Boeing vs Airbus, Alcoa, entry deterrence, Phillips

Bargaining games

Dynamic Pricing: infinitely repeated games

Sequential games with asymmetric information: Perfect Bayesian equilibrium, labor signaling game, poker