

# EC 325 Strategy: An Introduction to Game Theory (Fall 2023)

Seminar Leader: Stephan Müller

Course Times: Mo 17:30-19:00, Tue 15:45-17:15

Email: [s.mueller@berlin.bard.edu](mailto:s.mueller@berlin.bard.edu)

## Course Description

Game theory is a fundamental discipline in the fields of economics, political science, biology, and beyond, as it provides a systematic framework for analyzing strategic interactions among rational decision-makers. This undergraduate course in Game Theory offers students a comprehensive introduction to the core concepts, principles, and applications of this fascinating field.

The course begins with an overview of the basic components of game theory, including players, strategies, payoffs, and extensive and normal form representations. Students will learn how to model different types of games, ranging from simple two-player games to more complex multi-player scenarios, and study various solution concepts such as dominant strategies, Nash equilibrium, and subgame perfection.

Throughout the course, students will explore various classical games, including the Prisoner's Dilemma, the Battle of the Sexes, and the Tragedy of the Commons. By examining these games, students will gain insight into real-world situations such as social dilemmas, competition, cooperation, and bargaining. Furthermore, applications of game theory in diverse fields will be discussed, ranging from economics and business strategy to politics, law, and environmental issues. The course will include interactive discussions and problem-solving exercises to enhance students' understanding of the concepts and their practical applications.

## Learning Outcomes

- **Understanding Core Concepts:** Students will demonstrate a comprehensive understanding of fundamental concepts in game theory, including players, strategies, payoffs, and different types of games (two-player, multi-player, simultaneous, and sequential).
- **Analyzing Strategic Interactions:** Students will be able to analyze strategic interactions between rational decision-makers, identify dominant strategies, and determine Nash equilibrium for a wide range of games.
- **Applying Solution Concepts:** Students will apply solution concepts, such as dominant strategies, Nash equilibrium, and subgame perfection, to predict outcomes and make informed decisions in strategic scenarios.

- Evaluating Game Dynamics: Students will examine and evaluate the dynamics of strategic interactions over time, including the concept of repeated games.
- Analyzing Real-World Applications: Students will identify and analyze real-world applications of game theory in various fields, such as economics, politics, business, and environmental issues.
- Critical Thinking and Problem-Solving: Students will develop critical thinking skills to analyze and solve strategic problems effectively, considering the interactions and incentives of all relevant players.

## **Requirements**

### Prerequisites

Students taking this course should have already successfully completed the courses “Mathematics for Economics,” and “Microeconomics.”

### Textbooks

For this course, we will use the following textbook:

- *Strategy: An Introduction to Game Theory* (2013) by Joel Watson (W.W.Norton).

Two excellent textbooks that we will also use (not as textbooks but we will cover some of the applications) are:

- *Strategy and Politics: An Introduction to Game Theory* (2015) by Emerson M.S. Niou and Peter C. Ordeshook (Routledge)
- *A Primer in Game Theory* (1992) by Robert Gibbons (Pearson)

**It is essential that you will repeat at home the material that we cover in class! (including solving again all the exercises that we did in the classroom).**

### Attendance

Attendance at ALL classes is expected. More than two absences (that is absences from two sessions of 90 minutes) in a semester will significantly affect the grade for the course.

### Use of cell phones

The use of cell phones is not allowed during the classes. Please leave your cell phone in your bag during the classes.

### Assessment

Assessment will be based on attendance, preparation for classes, regular and active participation, professionalism (see below), quizzes, exercises as well as a midterm (60 minutes) and final examination (90 minutes).

## **Grade breakdown**

Seminar preparation, professionalism and participation 20%

Quizzes and exercises 20%

Midterm examination 30%

Final examination 30%

## Schedule and Course structure

Classes start on Monday Sep 4 and run until Tuesday Dec 12, with fall break planned for Oct 23 – Oct 27. Completion week is from Dec 18 until Dec 22. **Attendance is mandatory during completion week. In principle, all students are required to stay in Berlin during completion week.**

The following course structure is provisional in order to allow for flexibility. It is the students' responsibility to keep themselves informed of any changes to the schedule provided here. An up-to-date schedule will be maintained by the course management in our Google classroom system. Lecture slides and problem sets will be posted in Google classroom. Please sign in for the course, password will be given in the first class.

### Tentative course structure:

	Topic	Reading
Part I	Introduction	
Week 1 Sept 4 & Sept 5	Introduction; Extensive Form	Watson, Chs. 1-2
Week 2 Sept 11 & Sept 12	Strategies; Normal Form	Watson, Ch. 3
Week 3 Sept 18 & Sept 19	Beliefs, Mixed Strategies, Expected Payoffs; General Assumptions and Methodology	Watson, Chs. 4-5
Part II	Analyzing Behavior in Static Settings	
Week 4 Sept 25 & Sept 26	Dominance and Best Response; Rationalizability and Iterated Dominance	Watson, Chs. 6-7
Week 5 Oct 2 & Oct 3	Location, Partnership, and Social Unrest; Nash Equilibrium	Watson, Ch. 8
Week 6 Oct 9 & Oct 10	Nash Equilibrium	Watson, Ch. 9
Week 7 Oct 16 & Oct 17	Oligopoly, Tariffs, Crime, and Voting Midterm Exam	Watson, Ch. 10
Oct 23 & Oct 24	Fall Break	
Week 8 Oct 30 & Oct 31	Mixed Strategy Nash Equilibrium; Strictly Competitive Games and Security Strategies;	Watson, Chs. 11-12
Week 9 Nov 6 & Nov 7	Contract, Law, and Enforcement in Static Settings	Watson, Ch. 13
Part III	Analyzing Behavior in Dynamic Settings	
Week 10 Nov 13 & Nov 14	Extensive Form; Sequential Rationality and Subgame Perfection	Watson, Chs. 14-15
Week 11 Nov 20 & Nov 21	Topics in Industrial Organization; Parlor Games	Watson, Chs. 16-17

Week 12 Nov 27 & Nov 28	Topics in Industrial Organization; Parlor Games	Watson, Chs. 16-17
Week 13 Dec 4 & Dec 5	Bargaining Problems; Simple Bargaining Games	Watson, Chs. 18-19
Week 14 Dec 11 & Dec 12	Repeated Games and Reputation; Collusion, Trade Agreements, and Goodwill	Watson, Chs. 22-23
Week 15 Completion week	FINAL EXAMINATION: tba.	

*Classes missed due to federal holidays will not be rescheduled.*

(this version: August 04, 2023)