

TOBB UNIVERSITY OF ECONOMICS AND TECHNOLOGY
Department Economics
ECON 415 Game Theory
2022-2023 SPRING

Professor: Ayça Özdoğan Atabay **Website:** <http://aycaozdogan.weebly.com>.
Office: 236 **E-mail:** [aозdogan@etu.edu.tr](mailto:aozdogan@etu.edu.tr) **Phone:** +90 312 2924543.
Class Hours: Monday 13:30-15:20, Friday 10:30-12:20. **Room:** 157
Office Hour: Thursday 14:30-15:30.

If the above office hour does not fit to your schedule, you can get an appointment. The best way to contact me is through email. I will try to respond to emails within 24 hours. I will be sending emails occasionally to inform you about the announcements, homework assignments and quizzes. Homework assignments will be posted on *uzak* platform at uzak.etu.edu.tr as well as on my website. It is YOUR responsibility to check your emails, the class website and the *uzak* platform at least once a week.

PREREQUISITES

The prerequisite for the course is ECON 214. It will be assumed that the students have completed ECON 214 successfully. Also, the students are expected to be familiar with mathematical notation and formal reasoning involving elementary operations, calculus and basic probability theory as we are going to read and write some proofs of selected theorems throughout the semester.

COURSE DESCRIPTION AND CONTENT

In making decisions, one cannot ignore the actions of others in most of the situations. The fact remains that most real-world decisions are not made in isolation, but involve interaction with others. Hence, in deciding how to act optimally in a given situation, each agent needs to consider how others are likely to act as well. Game theory is a discipline that provides a mathematical methodology and set of concepts for modeling and analyzing interactive decisions among multiple agents. We will learn how to use game theory to *formally* study situations of potential conflict and cooperation: situations where the eventual outcome depends not just on your decision and chance, but the actions of others as well. Game theory has a wide range of applications in economics, political science, computer science, law, international relations, sports, politics etc.

The language of game theory is mathematical. Definitions will be stated formally and arguments will be developed rigorously as in a math class. At the same time, much of the course will be devoted using game theory to understand applications in economics. We will develop an understanding of what constitutes a good mathematical model for addressing an economic question.

TEXTBOOK

Main textbook

Osborne, Martin J., *An Introduction to Game Theory*, Oxford University Press (2004) (0)

Recommended books

Gibbons, *Game Theory for Applied Economists*, Princeton University Press (1992)

Kreps, *Game Theory and Economic Modeling*, Oxford University Press (1991)
Dixit, Skeath and Reiley *Games of Strategy*. 4th Edition, W.W Norton (2015)
Tadelis, *Game Theory: An Introduction*, Princeton University Press (2013)
Dutta, *Strategies and Games: Theory and Practice*, MIT Press (1999)
Watson, *Strategy An Introduction to Game Theory*, Second Edition, W.W. Norton (2008)

Additional resources

TÜBA Open Course Materials: <http://www.acikders.org.tr/>
MIT Open Courseware: <https://ocw.mit.edu/courses/economics/>
<http://www.gametheorysociety.org/resources.html>
<http://www.gametheory.net/>

Lecture notes of Prof. Levent Koçkesen:

<http://home.ku.edu.tr/~lkockesen/teaching/econ333/lectnotes/uggame.pdf>

COURSE REQUIREMENTS AND GRADING

There will be several homework assignments and random number of random quizzes, one midterm exam and a final exam. The weights of these in your final grade are as follows:

Homework (%20) + Quizzes (%10) + Midterm (%30) + Final (%40)

Pop-Quizzes (%10)

The quizzes will relate to current and previous topics and may select from homework questions. A quiz may be given at any time during any class period, at the beginning or end of a class, etc. There will be no make-up quizzes.

Homework (%20)

The late homework scores will be discounted with 0.8. No homework assignments will be accepted **2 business days** after the due date. You can cooperate and work together with your classmates for the homework assignments. While students are permitted to discuss the assignments, you must acknowledge any such discussions. However, everyone has to write his/her own assignment **independently** and **cite** the names of the people whom they work with.

Midterm (%30)

The exams will cover all material that is taught during the class or assigned to students. Make-up for tests will be granted only in case of a valid and documented reason accepted by the Institute. If a student knows he/she will be absent on the day of the exam for legitimate reasons (such as participation in activities sponsored by the university etc.), it is his/her responsibility to notify the instructor as far in advance as possible (again, with documentation).

Final (%40)

The final is cumulative. The exams will cover all material that is taught during the class or assigned to students. The final score will be computed based on your absolute performance throughout the course. Below are the grading cut-off points:

AA: 92-100, BA: 85-91, BB: 78-84, CB: 70-77, CC: 65-69, DC: 56-64, DD: 50-55.

CLASS RULES

- **Make-ups:** Make-up for tests will be granted only in case of a valid and documented reason. Absence without any valid documentation will result in a grade of 0 from that exam. In case of an illness, you are required to bring a formal doctor's note from a hospital. You have to bring the doctor's note within 5 business days after the exam.
- **Attendance:** Students are required to come to, and leave class, just on time. Attendance to at least 70% of classes is compulsory to get a letter grade other than U.
- **Incomplete (I)** will only be given in cases of documented emergencies. Doing poorly in the course will not be considered as a valid reason for receiving an "I."
- **Disruptive Behaviors:** Disruptive behaviors, such as talking excessively and using unauthorized electronic devices during class, are not permitted. Students with repetitive and disruptive behavior may be removed from class.
- **Plagiarism, Cheating and Collusion:** Students are expected to refrain from any form of plagiarism, cheating and collusion. Cheating, plagiarism, and collusion are serious offenses resulting in a grade penalty and disciplinary action.
- **Grade Changes:** All students have the right to view their graded exams, quizzes and homeworks. At the end of the semester, a grade change will be made only in the unlikely case of an error of fact.

NOTES ON ACADEMIC HONESTY

All the work submitted must be that of student. You are encouraged to work with others in understanding the concepts and problems. However, each student must hand in their own homework assignment and all the sources of information and references used including a classmate (except for the textbook, lecture and recitation notes) must be **cited**. Identical answers will receive a score of zero. If the academic dishonesty occurs on a final or midterm, a grade of F or N will be received. Cheating and plagiarism will be penalized according to the disciplinary rules of the university and YÖK.

TENTATIVE COURSE PLAN

The following is a list of topics to be covered. You will be responsible for all the lecture material and hence the attendance is essential. The lecture material will be in the same line as Osborne, sometimes skipping some topics and other times adding more material and examples in greater detail.

0. Introduction, Ch 1 (0)

What is game theory? (Rationality, common knowledge)

Cooperative vs non-cooperative game theory

Normal form games vs. extensive form games (Observability, timing)

Games with complete information vs incomplete information

I. Non-cooperative Games

1. Games with Complete Information

- A. Static (normal form) games, **Ch.2-4 (O)**
 - Basic notions and definitions
 - Dominant Strategy equilibrium and IEDS
 - Nash equilibrium: Theory.
 - Mixed Strategies and Mixed Strategy Nash equilibrium: Theory
 - Nash equilibrium: Applications (Market competition, electoral competition, auctions...)

- B. Sequential (extensive form) games, **Ch.5-7 (O)**
 - Perfect information games and backward induction
 - Imperfect information games and subgame perfect equilibrium
 - Applications (Stackelberg duopoly and bargaining)

- 2. Games with Incomplete Information
 - A. Static games with incomplete information, **Ch.9 (O)**
 - Bayesian equilibrium: Theory and applications (auctions)

 - B. Dynamic games with incomplete information, **Ch.10 (O)**
 - Perfect Bayesian equilibrium
 - Sequential equilibrium
 - Signaling games

- II. Repeated games (if time permits) **Ch.14-15 (O)**
 - Repeated Prisoners' Dilemma
 - Minmax theorem, Folk theorem