

COURSE INFORMATION

Instructor: Mehmet Barlo

Office/Phone: FASS 1024; (90) 216 483 9284

Office Hours: By appointment.

email: barlo@sabanciuniv.edu

Teaching Assistant: Sonnur Baş

email: sonnur.bas@sabanciuniv.edu

Course web-page: SUCourse+

Class: Monday 16:40 - 18:30 FASS1103; Wednesday 10:40 - 11:30 – FASS G006

Recitation: Friday 09:40 - 10:30 – Online

COURSE OBJECTIVES

The goal of this course is to further knowledge of applications and theories in the area of games of normal form and extensive form. This is a *serious* course in which you will learn how to do game theory, including its technical sides. We are going to derive most of the results from primitives and will not take any formulae as given. After learning some equilibrium concepts, we will solve many games from economics, business, sports, politics, gambling, etc.

I hope that by the end of this course, your point of view (not only the one towards economics but also towards many fields of social sciences) will be refined.

BACKGROUND

You are expected to be familiar and fluent with introductory calculus, ECON201, and ECON 204. In the course, we are going to read and write some proofs of selected theorems. I may review some aspects of writing proofs if I see fit.

It is important to point out that you are **not** required to have taken a Mathematical Analysis course (*MATH 301*). Even though the level of analytical abilities is not low, the mathematics that I will be using involves only elementary operations (used in concise and elaborate analytical steps).

TEXTS & STUDY MATERIALS

We will not use a particular book. Our **main sources** are our lecture notes and the scanned materials that I will send during the conduct of the course (including answer keys and additional study materials). We also have static online lecture materials from previous years, along with their lecture notes. All of those will be sent as pdf files and announcements using our website SuCourse+.

On the other hand, the books listed below cover the same material with lots of examples.

- *Game Theory for Applied Economists*, Robert Gibbons, *recommended*, the author is a famous game theorist, and the book is very well organized. That is a very good book that you want to keep for your own library. I will put important parts of it to the reserve at the library if needed.

- *Game Theory and Economic Modeling*, David Kreps, Oxford University Press, 1991; *recommended*, it is a very famous book by a well-known game theorist offering a solid introduction to the subject. That is a very good book that you want to keep for your own library. I will put important parts of it to the reserve at the library if needed.
- *A course in Game Theory*, Martin Osborne and Ariel Rubinstein, MIT Press, 1994; *recommended*, this too is a very famous book by two well-known game theorists. It is an introductory game theory textbook for graduate-level game theory. That is a very good book that you want to keep for your own library. I will put important parts of it to the reserve at the library if needed.

COURSE CONDUCT & METHODOLOGY

Due to the decision of Sabancı University, **our course will be conducted in hybrid style – both physically (on the campus) and online**. The details of the *hybrid* system I intend to employ emerge as follows:

- All of our lectures are to be conducted **synchronously** and (if the pandemic permits) in **FASS 1103** on Mondays and in **FASS G006** on Wednesdays as long as otherwise announced via the SUCourse+ system.

- For each of our physical lectures, we will have a **recorded Zoom meeting**, which will be broadcast live to its participants. Indeed, the online participants will have the opportunity to interact with the physical participants (asking questions, engaging in discussions, etc.).

The record of the Zoom meeting will be shared with the class via the SUCourse+ system.

- There will be weekly **recitations** conducted **online** by Sonnur Baş, the ECON TA assigned to our course. Your TA will arrange a recorded Zoom meeting every week and share the recording via the SUCourse system.

The recitations will start in the third week of our course (and hence, there are no recitations in the first two weeks of the course).

- You are supposed to join these meetings (both the lectures and the recitations) either physically or online.

Nevertheless, all our meetings will be recorded, and these recorded Zoom meetings will be available online for those of you who missed them. Still, I need to stress that your participation is strictly expected!

Consequently, our course is closed to time conflict permits. If you cannot graduate without taking this course at the end of this semester (Spring 2022), please contact the Dean's office of the faculty you are registered to. I could register you to this course if you were to get their confirmation and approval.

- My advice for you is to follow this course on a timely basis and work every week as the course progresses. If you wait, do not follow the course and accumulate materials, do not come to our meetings to ask questions, and study just before the examinations, then it is highly probable that you will not show a strong performance.

Hybrid teaching methods, I think, are very efficient for those students who want to learn. Therefore, please regard this as a *fair warning* urging you to come to our meetings, work in a timely manner, and follow the course.

I trust your rationality in that regard. That is why I will not restrict access to our videos as the course progresses. So unlike some of my colleagues, I will not use a policy so that I get rid of the lecture video after some period of time (e.g., a week or two weeks).

- The examinations of this course will be conducted adhering to the regulations called for by our university. Currently, all midterm and final examinations are to be conducted physically. However, this can change due to the pandemic. If so, we will be bound by the regulations/demands of our university. In that regard, make sure to follow the university's respective announcements and my announcements via the SUCourse system.

GRADING

- **Attendance** is essential in this course.

That is why I expect each student to be present in every synchronous lecture (either physically or online) of this course. Moreover, according to YÖK regulations, we have to take attendances for both the physical and the online participation into our lectures. Thus, at the end of the class, the attendance figures will be quite transparent.

- **Take-Home Examinations:** (%30 of grade) There will be 4 or 5 take-home examinations (depending on our speed), each with a due date of 1 (or 2) week(s).

Important Issues concerning take-home examinations:

- Students are encouraged to work together. Thus, come together and do the questions in a group. BUT, no outsiders under any circumstances! This cooperative work permit extends only to your fellow students, and if I catch you getting your homework done by an outside party (with or without compensation), I will pursue this with all the disciplinary regulations available.

Notice that these are not homework assignments but take-home examinations. Thus, according to YÖK regulations, they are *subject to disciplinary regulations*.

- Each student has to **submit his/her work separately**. I will not accept “group answers”. Those who submit such work will get 0 from that particular work.
 - The front page of the work **MUST** contain all the names of the students that you worked with. These names have to be listed in a “*list of collaborators*”.
 - As the answer keys will be posted online at the due date, **no late take-home examinations will be accepted**. This is a strict rule, so please adjust yourselves accordingly.
- **Midterm:** (%30 of grade) There will be **one midterm**.

The midterm will cover all the subjects up to the beginning of the extensive-form (dynamic) games. The particular timing of the midterm will be determined together with the students in the class. Moreover, the details of the procedures to be applied in connection with the midterm will be announced via SuCourse+ prior to the exam.

- **Final:** (%40 of grade) The final will be comprehensive –covering all the subjects– and will be administered on the date announced by the ÖK.

Details of the procedure to be applied in connection with the final will be announced via SuCourse+ prior to the exam.

COURSE CONTENT

Students will be responsible only for the material they see in the lectures. So, they will not be responsible for subjects that are not covered in the lectures. And now the list of topics to be covered:

0. Preferences over Lotteries

- Modeling risk via lotteries, preferences over risky prospects, and rationality of individuals facing risky prospects,
- The expected utility theorem and its significant applications.

I. Games of normal form under perfect information

- Definition, and modeling strategic situations of one-shot nature,
- The expected utility theorem, and mixed strategies,
- Rationality considerations: Strict domination, Iterated elimination of strictly dominated strategies, weak domination, and rationalizability,
- Nash equilibrium, and its existence,
- Examples and applications in industrial organization:
 - Cournot, and Bertrand equilibria,
 - Bargaining,
 - Wars of attrition, games of timing,
 - Other examples,
- Non-stability of Nash equilibrium, refinements, (trembling hand) perfect equilibrium,

II. Games of extensive form

- Definition, modeling of strategic interactions involving a sequence of moves
- Behavioral strategies,
- Subgame perfect equilibrium,
- Repeated Games,
- Examples and applications in industrial organization.
 - Von Stackelberg competition,
 - Repeated Cournot oligopoly,
 - Repeated Bargaining.

After finishing the above subjects, time permitting, we will continue selecting subjects from the following list:

III. Normal form games with imperfect information

- Definition, and modeling one-shot strategic interaction under imperfect information,

- Bayesian Nash equilibrium,
- Moral hazard, adverse selection,
- Auctions.

IV. Extensive form games with imperfect information

- Definition, and modeling sequential strategic interaction under imperfect information,
- Perfect Bayesian and Sequential equilibria,
- Examples, and applications in industrial organization
 - Signalling games,
 - Entry deterrence games.

V. Cooperative Games

- Definitions, and modeling strategic interaction of cooperative nature,
- Transferable utility versus non-transferable utility cooperative games,
- games in coalitional form, convex games, balanced games,
- Core,
- Shapley Value,
- Bargaining, coalition formation, and cooperation,
- Noncooperative justification for coalition formation, Correlated Equilibrium.

POLICIES: EXAMINATIONS AND SCHOLARLY CONDUCT

1. Take-home examinations should be turned in by the announced deadline. Our policy is strict and decrees that *no late take-home examinations will be accepted*.
2. All answers to take-home examinations, midterm, and the final must be neatly and clearly written. The grader is the final judge of what is legible and may request specific students to type their work.
3. Collective and cooperative work on take-home examinations is strongly encouraged. However, any take-home examination *must* be written up separately by the owner of it. Additionally, any take-home examination *must* contain the list of the fellow students with whom the work was done under the heading “List of Collaborators”.

Notice that students are encouraged to work together. However, this does not extend to outsiders under any circumstances! The cooperative work permit is for your fellow students only. If I catch instances of a student getting his/her homework done by an outside third party (with or without compensation), I will pursue this with all the disciplinary regulations available. In that regard, notice that these are not homework assignments but take-home examinations. Thus, according to YÖK regulations, they are subject to disciplinary practices.

4. During physical midterm and final examinations (and their make-up examinations if granted), all students are to prove their identity (via a formal id card) and sign the attendance sheet, which will be taken by the proctor(s) of the examination. At the end of the examination, every student (whose name appears on the attendance sheet) has to turn in their work. Failure to do so counts as

a violation of rules (*Kural İhlali*) and would result in the draft of the so-called *Kural İhlal Tutanağı* that may result in disciplinary consequences.

On the other hand, during online midterm and final examinations (and their make-up examinations if granted), the attendance sheet will be taken by the proctor(s) of the examination using the Zoom participation list. That is why every student has to join the Zoom meeting of the examination with their formal “sabanciuniv.edu” email account.¹ Students’ ids will be recorded (into the online Zoom meeting recording) by asking them to show their faces and formal id cards to the camera. In furtherance, during online midterm and final examinations (and their make-up examinations if granted), the webcam of the student must always be on. Otherwise, the examination at hand will be void. At the end of the examination, every student (whose name appears in the Zoom participation list) has to turn in their work. Failure to email the exam paper to the instructor and/or proctor counts as a violation of rules (*Kural İhlali*) and would result in the draft of the so-called *Kural İhlal Tutanağı* that may result in disciplinary consequences.

5. Make-up exams are granted only in case of a valid and documented reason. Absence in exams without any valid and documented excuse will result in a grade of 0 from that exam. In case of an illness or other documentable excuses, the student is required to contact me within three business days with a petition summarizing his/her situation and preferably presenting documentation for their excuses.² I will also accept a formally written email from the sabanciuniv.edu email address of the student, and hence the petition does not have to be physical. The documentation could be in the form of a formal doctor’s note from a state hospital³ or police/insurance report in case of a minor traffic accident providing details; and so and so forth. All verified documentation has to be submitted physically in three business days following the expiration of the excuse or the verification date. If the instructor finds the excuse of the student valid, then either a make-up examination will be arranged, or the corresponding points from that examination will be shifted to the consequent examination. I wish to emphasize that due to YÖK regulations, I have to be quite strict about these formalities.
6. A student who fails to show up for the final examination without a valid excuse is not eligible to take the make-up of that examination, and will receive N/A (and not F) as his/her final grade. Moreover, we adopt the following *grading policy*: A student who does not show up for the midterm examination without a valid excuse and does not hand in three or more take-home examinations without valid excuses will not be eligible to enter the final and will receive a N/A as his/her final grade.
7. The definition for scholastic dishonesty is as given in the rules and regulations/announcements of the Sabancı University and include aspects concerning online evaluation/examination practices.
8. In case of scholastic dishonesty, no credits will be given for that particular work. Cheating during written work will result in an F for the course. All incidents of scholastic dishonesty will be reported to FASS.

¹Students are not allowed to utilize other emails unless explicitly permitted by the instructor.

²These regulations are from the “Sabancı Üniversitesi Lisans Eğitim ve Öğretim Yönetmeliği” – *Resmî Gazete No: 29607 Tarih: 28 Ocak 2016* Madde 22-2-a.

³A doctor’s note taken from a doctor’s private practice does not count as formal. In the case of private hospitals, the doctor’s note has to be verified by the university health service within five business days following the expiration date of the doctor’s note.