

## COURSE INFORMATION

**Instructor:** Mehmet Barlo  
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**Office Hours:** By appointment.  
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**Course web-page:** SUCourse+  
**Class:** Wednesday 16:40 - 19:30 **FASS 1011**  
**Recitation:** Monday 16:40 - 17:30 – FASS 1099

## 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

Our course will be conducted **only physically (on the campus)**. The details of the system I intend to employ emerge as follows:

- Our lectures will be conducted **physically**.

Required and appropriate changes will be discussed in class and announced via SUCourse.

- **Attendance** to this course is **mandatory**. That is why for each of our physical lectures, we will take attendance.

Moreover, **students who attend our lectures 4 or fewer weekly lectures (each consisting of 3 lecture hours) without valid excuses will not be granted final examinations**; their finals will not be eligible for grading.<sup>1</sup> Such students will be awarded an NA letter grade.<sup>2</sup>

These are strict rules.

- There will be weekly **recitations** conducted **physically** by Ar. Gör. Hüseyin Çelik in FASS 1099 between 16:40 - 17:30 on Mondays. Recitation attendance will be taken.

We will not have a recitation in the first two weeks. Then, the recitations will start on the 4th (Monday) of March.

Required and appropriate changes to recitations may be needed during our course. Such changes will be announced (via the SUCourse) after being discussed in our lectures.

Notwithstanding, please do not send me time conflict permits regarding this time slot. We are going to use it. If you intend to take this course, come to our first meeting on Wednesday the 21st of February and discuss your situation with me. If permitted, you would be able to “add” the course during the add-drop period.

- 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. Please regard this as a fair warning urging you to come to our meetings, work in a timely manner, and follow the course.

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<sup>1</sup>Please refer to Policies item 5 for the details about valid excuses.

<sup>2</sup>Attendance in a lecture demands spending at least half of the lecture time in class. Thus, a student signing the attendance document at the beginning of the lecture and leaving in the fifth minute will not be counted as attending the class; his/her name will be crossed from the list, and this instance will be formally documented on the attendance sheet. Similarly, this also holds for a student coming in the 40th minute and signing the attendance at the end of the lecture.

- 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 unforeseen conditions (such as the reemergence of 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.

Depending on our speed and following my assertion to have a midterm, we will determine the time of the midterm together in class. I reserve the right to serve as a tie-breaker and/or a dictator in cases of disagreements among the students.

## GRADING

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

That is why I expect each student to be present in every lecture of this course.

- **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.
- Further details about the procedure(s) to be applied in relation to take-home examinations will be announced via SUCourse.

- **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.

**Students who attend our lectures 4 or fewer weekly lectures (each consisting of 3 lecture hours) without valid excuses (see Policies item 5) will not be granted final examinations and their finals will not be eligible for grading. Further details about the procedure(s) 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. Behavioral normal form games under perfect information

- Choices, behavioral aspects, rationality, and utility representation,
- Behavioral Nash equilibrium (in pure strategies) and the problem of non-existence.
- **Choices/Preferences over Lotteries** under rationality
  - 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. Indeed, 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.
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.<sup>3</sup> 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 hospital<sup>4</sup> 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. Students who attend our weekly lectures 4 or fewer times (each weekly lecture consisting of 3 lecture hours) without valid excuses (see Policies item 5) will not be granted final examinations and their finals will not be eligible for grading. Further details about the procedure(s) to be applied in connection with the final will be announced via SUCourse prior to the exam.
7. A student who fails to show up for the final examination without a valid excuse and does not take the make-up examination of the associated examination will receive N/A (and not F) as his/her final grade.
8. 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.
9. 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 for disciplinary action.

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<sup>3</sup>These regulations are from the “Sabancı Üniversitesi Lisans Eğitim ve Öğretim Yönetmeliği” – *Resmî Gazete No: 29607 Tarih: 28 Ocak 2016* Madde 22-2-a.

<sup>4</sup>A 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.