

ECON 404: Games and Economics (Fall 2021)

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Administrative details

Date and Location: Monday and Wednesday 10.00am-11.50am in KAP144.

Office hours: Wednesday 4.00pm-5.00pm in my office at KAP120C.

Teaching Assistant: Jingyi Tian, email: <jingyiti@usc.edu>

Office hours of Teaching Assistant: Thursday 10am-12pm at KAP 337.

Note on COVID-19

This course is only in-person. There will be no live stream and no recording of lectures.

Disability

Students requesting academic accommodations based on a disability are required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP when adequate documentation is filed. Please be sure the letter is delivered to me (or to the T.A.) as early in the semester as possible. DSP is open Monday-Friday, 8:30-5:00. The office is located at Student Union 301 (Ph: 213-740.0776).

Prerequisites

The only formal prerequisite is Intermediate Microeconomics (ECON 303). However, *introductory and intermediate courses both in Calculus and Probability Theory are also necessary to be able to follow the course*. Last and foremost, students should be comfortable with mathematical notation and formal reasoning. according to my past experience, students without substantial mathematical training find the course very difficult to follow. I urge those without the background outlined above to contact me before deciding to enroll in the course.

Description of the course

Game theory analyzes situations in which two or more decision-makers (individuals, firms, political parties, countries, etc.) interact in a strategic manner. It has proved useful in helping us understand better situations involving conflict and/or cooperation and has found many applications in economics, business, political science, law, social psychology, and biology. Among those applications are firm competition in markets, technological races, auctions, voting behavior, cultural norms, import tariffs, etc. The aim of this course is twofold. First and most importantly, we will provide a systematic introduction to the tools of game theory. We will learn how to construct theoretical frameworks that capture the key elements of strategic interactions and determine the most likely outcome in any given game. Second, we will illustrate the theoretical concepts with some specific applications, and we will discuss some shortcomings of the theory. Overall, this is not a course designed to learn recipes for solving specific types of problems but rather a course designed to learn how to pose and solve problems of very different nature. In the past years I have started to introduce some

laboratory experiments in order to illustrate both the robustness and the limits of traditional Game Theory.

Main textbook (required)

- *Game Theory for Applied Economists*, Robert Gibbons, Princeton University Press: Princeton, NJ (1992).

I know that prices of books are ridiculous. This book can be purchased online for \$40.00 approx. (even less for a used copy). At this price, there is no excuse for not having the book.

Other books of interest (entirely optional)

There are many other excellent books in game theory. These books are *not* required but they can be excellent complements for students who want to go deeper into game theory. Here is an incomplete list with a short description.

- *Strategy: An Introduction to Game Theory*, Joel Watson, W.W. Norton (2002)
A book comparable in quality and technical difficulty to the required book.
- *Game Theory*, Drew Fudenberg and Jean Tirole, MIT Press: Cambridge, MA (1992)
An outstanding but much more technical (graduate level) book on game theory.
- *Games of Strategy*, Avinash Dixit and Susan Skeath, W.W. Norton (1999)
A bed-time reading, non-technical book with some entertaining anecdotes.
- *Markets, Games and Strategic Behavior*, Charles Holt, Addison Wesley (2006)
A book on laboratory experiments that applies the concepts of game theory.

Grading

The final grade is a weighted average of three components:

- Take-home assignments (number of assignments to be decided, most likely 5 or 6): 20%
- In-class midterm exam: 35%
- In-class final exam: 45%

Both take-home assignments and in-class exams (midterm and final) will consist of problem set questions (no need to learn definitions or anything like that). In-class exams will be closed book. Take-home assignments should be done individually or in groups of two (maximum) but they have to be turned in individually. Do not discuss your results with people outside your group. Each assignment will be distributed roughly one week prior to the due date and it will be collected at the beginning of class. In case you cannot attend class, you can either send it to the T.A. by e-mail or drop it in my mailbox. Make sure you do so before class. Late assignments will not be accepted. If you have problems doing the assignment, you can ask the T.A. for clarifications but please don't expect the T.A. to solve the problem for you or tell you the solution.

If you wish to appeal your grade on an in-class exam, you must return your assignment to me along with a memo explaining why you think the grade should be changed. All exams will be re-graded in their entirety.

Important dates

- Last day to enroll and to drop class: September 10
- Last day to drop a class with a mark of W: November 12
- **In-class midterm exam: Wednesday October 13, 10am to 11:30am (in class)**
- **Final exam: Monday, December 13, 8am to 10am**

Important: if the in-class examinations fall at a time that conflicts with your observance of a holy day, make sure to contact me before September 13 to schedule an alternative date (before the proposed one).

Exercise classes

Every four weeks approximately, there will be an exercise class taught by the T.A. The purpose is to (i) review the course material, (ii) solve exercises and (iii) solve the take-home assignments. It is mandatory to attend those classes, as assignments will not be solved in class and exams will consist largely of problem set questions similar to these ones.

Web

Important information (e.g. deadlines for assignments, dates of exams, preparation material, etc.) will be posted on the web. I am planning to use Blackboard this year. Please be patient. The most efficient way to communicate with me is by email (<juandc@usc.edu>). I do not have an office phone anymore.

Outline (subject to change)

PART I. Normal form (static) games

1. **Normal form games of complete information:** background and definitions.
2. Dominant strategy equilibrium and dominance solvability.
3. Nash Equilibrium.
4. Applications (beauty contest, market competition, arbitration, the commons problem) and limits of the theory.
5. Mixed strategies: theory and applications (merchants-ship-warship, war of attrition, serve-and-return).
6. **Normal form games of incomplete information:** mixed strategies revisited.
7. Applications (auction, Cournot duopoly).

PART II. Extensive form (dynamic) games

8. Introduction to dynamic decision-making: the one-agent case.
9. **Extensive form games of complete and perfect information:** backward induction equilibrium.
10. **Extensive form games of complete but imperfect information:** subgame perfect equilibrium.
11. Applications (bargaining, Stackelberg duopoly, the multi-self agent).
12. Infinitely repeated games.
13. **Extensive form games of incomplete information:** perfect Bayesian equilibrium.
14. Applications (signalling and adverse selection).