ECO 4400: Game Theory and Applications
Syllabus

Instructor: Luca Mantegazza
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Class Location: Matherly Hall 107
Class Meeting Time: Monday and Wednesday, periods 5 and 6

Course Prerequisites: Principles in Microeconomics (ECO 2023 *or equivalent*) and Calculus I (MAC 2233 *or equivalent)*
[suggested only] Intermediate Microeconomics (ECO 3101 *or equivalent*)

Optional Texts:
"Introduction to Game Theory" by Martin J Osborne
"Game Theory: An introduction" by Steven Tadelis
"A course in Game Theory" by M. J. Osborne and A. Rubinstein
"Political Game Theory: an introduction" by N. McCarty and A. Meirowitz

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COURSE DESCRIPTION

This course examines the main ideas and tools in the field of Game Theory. Each topic will be explored from the perspective of the players / agents (Game Theory) and from the perspective of the "game designer" (Mechanism Design). The course is divided into eight modules each one introducing games and mechanisms that are progressively more generic and/or sophisticated. The main goal of the course is for the student to understand the logic and the reasons behind the main topics explained in class and their applications to real life problems. For this reason, the focus of each lecture will be more on the understanding of each tool and idea and less on its mathematic description and discussion. However, this does not mean that mathematic applications will not be discussed in class or required to succeed in the tests.

COURSE OBJECTIVES

1. Being able to identify and describe the main types of games discussed in the field of game theory.
2. Understanding the main solution mechanisms in the field of game theory and their differences, and being able to know when and how to apply each one.
3. Being able to describe and analyze "real life situations" using tools from game theory.
4. Acquiring preliminary exposure to related disciplines (e.g., behavioral economics, agent-based modelling, mechanism design) and understanding how they are related to game theory.

CLASS MODALITY

This is a fully in-person course. Lectures will not be streamed nor recorded. All midterm exams will take place in person, during our scheduled class times.

COURSE REQUIREMENTS AND GRADING POLICY AND SCALE

Grades are calculated as follows:

- Class attendance, participation, and preparation (20%)
    - Attendance and participation – 2.5%

    - Preparation 17.5%
- Midterm 1 (20%)
- Midterm 2 (20%)
- Group Project (40%)
    - Final Project – 30%
    - Class Presentation – 10%

A	92.00 – 100	C	72.00 – 77.99
A-	90.00 – 91.99	C-	70.00 – 71.99
B+	88.00 – 89.99	D+	68.00 – 69.99
B	82.00 – 87.99	D	62.00 – 67.99
B-	80.00 – 81.99	D-	60.00 – 61.99
C+	78.00 – 79.99	E	0 – 59.99

The scale listed above is firm. Final course grades will not be rounded. Students should assume that 91.99 is followed by an infinite number of nines and is an A-. The rest of the cut-offs follow accordingly.

Make-up assignments and exams will be arranged only for absences that are explicitly covered by the UF Attendance Policy. Whenever possible, you should reach out at least five business days in advance to arrange a make-up assignment or exam. Of course, this will not always be possible. Unforeseen absences and emergencies occur and can be excused without such advance notice. In most cases, you will be asked to provide evidence or documentation of an absence that is explicitly excused by the UF Attendance Policy. Absences related to religious holidays and worship do not require this documentation.

The above grading policies are consistent with UF policies regarding grade determination. This information can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

1. ***Class presence, participation, and preparation (20% of the final grade):***

1.1 Presence and Participation (25 points)

Attendance is highly correlated with better grades and thus strongly encouraged. You are required to be in class on time as a form of respect towards both the instructor and your classmates. I will take attendance at the start of each class but I will not use the Canvas system to automatically deduct points for missed classes and late arrivals; at the end of the course, I will weigh the number of absences and delays with participation in class to determine the contribution to the final grade. Timely and appropriate justification are encouraged and appreciated. If you have missed a class, it is your responsibility to find out relevant information from other students – therefore, make sure you have the contact details of at least one other student in the class. In order to show respect for classmates and the instructors and to improve the learning experience for everybody, the use of cell phones, email, texting etc. is not tolerated. You can use your electronic devices only to take notes even though I strongly encourage you to use pen / pencil and notepad since during most classes we will study and analyze graphs, diagrams, and tables.

1.2 Preparation (175 points)

After the first class of each module, you are requested to submit two examples related to the topic(s) that will be discussed in that module. One example has to be based on everyday life situations (e.g., planning a trip with friends, deciding how to split the bill at a restaurant, dealing with the landlord, etc.) and one example has to be based on contemporary sociological, political,

economic issues. At the end of each module, each student will be asked to anonymously analyze one of the games prepared by another student (i.e., applying solutions mechanisms to it). While each student will not know whose work they are reviewing or who has reviewed their work, they will be able to see the comments. Also, the instructor will know who has reviewed what and will be able to assess the quality of each reviewer's job.

2. Two midterm tests (200 points each, for a total of 40% of the final grade)

Each test is not cumulative: the first midterm will cover modules 0 through 3; the second midterm will cover modules 4 through 7. Each midterm will last the two periods of the class on that day and will consist of a combination of short open answer questions, and mathematical and/or analytical exercises. The tests are closed-book and closed-note. Only basic four-function or scientific calculators are allowed (no graphic calculators, phones, etc.).
See the calendar below for the exact dates

3. Group project (40% of the final grade)

3.1 Final Project (300 points)

The group project will analyze a real-world topic using the tools studied in class. Each project consists of eight sections, one for each module. Groups are encouraged to submit a draft of each section after the respective module, but this is not required. Each group member will be responsible for two specific sections and the grade of each student will be calculated as the average of the grade of each section they were responsible for and the overall grade of the final project. This should encourage students to work together to improve the overall quality of the project while rewarding additional effort of individual students. Additional instructions will be provided during class and on Canvas.

3.2 Presentation(s): 1 or 2 during the semester (100 points total)

At the beginning of each module and during the classes dedicated to revision, I will ask groups to present their section on one of the modules covered up to that point. This should help reviewing the material and also to encourage each group to start working on their project as soon as possible.

Ideally, each group will consist of four students, but the actual number will depend on the number of students taking the class. All works must be submitted exclusively as a PDF file by the deadline.
See the calendar below for the exact dates

UF POLICIES AND ASSISTANCE

Professionalism and Honor Code: Students are bound to not cheat or plagiarize, and are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: 'On my honor, I have neither given nor received unauthorized aid in doing this assignment.'"

You should familiarize yourself with the UF Student Honor Code. Cheating and plagiarism are not the only violations of this policy. Importantly, ignorance of a policy is not a valid reason for violating it.

Students Requiring Accommodations: Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource

Center. Click here to get started with the Disability Resource Center. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation: Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via ufl.bluera.com/ufl/.

UF Teaching Center: The UF Teaching Center offers guidance on study skills and tutoring services. You can find more information at: https://umatter.ufl.edu/office/teaching-center/.

Health Counseling and Emergencies:

U Matter, We Care:
If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

COURSE SCHEDULE

Lecture	*Date*	*Topic*
1	Jan 8	Syllabus/Introduction + Description of the Group Project
2	Jan 10	**Module 0** – Elements of a game
	Jan 12	*Examples on Module 0 due*
	Jan 16	*Analysis of one example on Module 0 is due*
		Module 1 – The basic games
3	Jan 17	Tree representation and introduction to the Nash Equilibrium *Groups are organized*
	Jan 19	*Examples on Module 1 due*
4	Jan 22	Solution concepts: Sub-Game Perfect Equilibrium vs Nash Equilibrium
5	Jan 24	Solution concepts: Sequential Equilibrium
	Jan 26	*Analysis of one example on Module 1 is due*
6	Jan 29	Histories, Memory, Information sets
		Module 2 – Adding uncertainty

7	Jan 31	*Group Presentation(s) on Module 1* Information Sets, Timing, Simultaneous playing, Table representation
	Feb 2	*Examples on Module 2 due*
8	Feb 5	Max-minimization
9	Feb 7	Continuous Strategy Space and Mixed Strategies
10	Feb 12	Importance of Knowledge and Signaling
	Feb 13	*Analysis of one example on Module 2 is due*
		Module 3 – Adding repetition
11	Feb 14	Finite, Infinite, and probabilistic games *Group presentation(s) on Module 2*
	Feb 16	*Examples on Module 3 due*
12	Feb 19	Repeated games: equilibria
13	Feb 21	Repeated games with signaling
	Feb 23	*Analysis of one example on Module 2 is due*
14	Feb 26	*Review before the midterm and group presentations on Module 3*
15	**Feb 28**	**FIRST MIDTERM**
		Module 4 – Removing information
16	Mar 4	Knowledge and Beliefs, Common priors
17	Mar 6	States (of nature) and Types (of players)
		Spring Break
	Mar 15	*Examples on Module 4 due*
18	Mar 18	States (of nature) and Types (of players)
19	Mar 20	Stochastic Games
	Mar 22	*Analysis of one example on Module 4 is due*
		Module 5 - Bargaining
20	Mar 25	Solution concepts – Axiomatic approaches *Group Presentation(s) on Module 4*
21	Mar 27	Bargaining Games, Disagreement point
	Mar 28	*Examples on Module 5 due*
	Mar 30	*Analysis of one example on Module 5 is due*
		Module 6 – Cooperation with divisible payoffs
22	Apr 1	Description of the game and the Core *Group Presentation(s) on Module 5*
	Apr 2	*Examples on Module 6 due*
23	Apr 3	Solution concepts: Shapley Value
24	Apr 8	Solution concepts: the Nucleolus
	Apr 9	*Analysis of one example on Module 6 is due*

		Module 7 – Cooperation with indivisible payoffs
25	Apr 10	Matching games *Group Presentation(s) on Module 6*
	Apr 13	*Examples on Module 7 due*
26	Apr 15	Matching games
27	Apr 17	Social Choice Theory
	Apr 19	*Analysis of one example on Module 7 is due*
28	Apr 22	*Review before the midterm and group presentations on Module 7*
29	**Apr 24**	**SECOND MIDTERM**
	Apr 26	**Submission of Group Projects**