ECO 4400: Game Theory and Applications
Syllabus

Instructor: Luca Mantegazza   **Fall 2017**
Office: MAT 332   **Course Time: M/W period 7-8**
Office Hours: T 11am-1pm (or by appointment) **Course Location: MAT 12**
Email: TBD
Phone: 392-0117

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

<u>**Required Text**</u>:   **"Political Game Theory: an introduction" by N. McCarty and A. Meirowitz**

COURSE DESCRIPTION

This course examines the main ideas and tools in the field of Game Theory and it is divided in to two main sections: proper game theory (description of different types of games and solution techniques and their application to real life issues) and mechanism design (definition of rules and incentives in order to create a "mechanism" such that agents participating into it perform desired actions).

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 presented during tests: only that solving the "games" will be less important, for the sake of grading, than showing understanding for the theory behind them (i.e. if in a test the student provides the right solution to a "game" without explaining why and how s/he did it, s/he will receive a lower grade than a student providing the wrong numerical solution but explaining clearly the reasoning behind the use of the specific tool).

COURSE REQUIREMENTS AND GRADING

1. *Class presence and participation (not <u>directly</u> affecting your final grade):*

Attendance is highly correlated with better grades and thus strongly encouraged especially since numerous examples will be provided during classes on the whiteboard and PowerPoint slides will NOT be used for this class. 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 for personal records but I will NOT use them when assigning final grades. If you have missed a class, it is <u>your responsibility</u> 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. IMPORTANT: during the course, there will be ten (10) "flash-tests" that will count for 30% of the final grade (3% for each test). If a student does not sit one of these tests s/he will score a zero on that test. Extra-sessions will be organized only for students that provide timely and reasonable justification (see below for the link to the UF policy on attendance).

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 and notepad since during most classes we will study and analyze graphs, diagrams, and tables.

2. ***Ten (10) flash tests (3% each, for a total of 30% of the final grade): see the calendar below for the exact dates***

Each flash-test will last between 30 and 45 minutes and consist of one or two short questions (to test the understanding of the theory) and one or two analytical problem type of questions with graphical and/or mathematical components (to test the understanding of the solution mechanisms). Each test will cover only the topics covered since the previous test (or the beginning of the course for the first set). More details will be given in due time.

3. ***Two midterm tests (20% each, for a total of 40% of the final grade)***

The first test will cover all the topics presented during the first half of the course and the second midterm will cover ONLY the topics covered in the second half. The tests dates are: October 10 and December 5. 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. More details will be given in due time.

4. ***Presentation of a two-part group project (15% for the project and 15% for the presentation, for a total of 30% of the final grade)***

The first part is the application of one or more of the tools analyzed in the first part of the course to a real-life topic, preferably in the field of economics, business, international relations, or politics. The second part is the design of a "mechanism" to solve a real-life problem using the tools studied in the second part of the course. During the presentation, I will ask question about both the theory behind and the actual applications of the tools. The grade will be determined by both the quality and originality of the work submitted and the performance of each student during the presentation. Since I will ask questions to each member of the group individually, the grade for the presentation could vary across group members, while the grade for the project will be the same for each member of the group.

IMPORTANT: the deadline to form the project groups (min. 2 – max. 3 people) is September 7, the deadline for the choice of the topic of the first part is October 5, and the deadline for the choice of the second topic is November 16. The presentations will take place on November 28 and 30. Students are required to attend both days, first out of respect for their classmates work and second because it is a good opportunity to review the main topics before the second midterm. Unjustified absence during presentation days will result in a penalty of 5 point on the final grade of the presentation.

The size of the group and the time allotted to each presentation will depend on the number of students taking the class.

GRADING POLICY AND SCALE

• Grades are calculated as follows: Ten (10) flash-tests (3% each for a total of 30%), Midterm 1 (20%), Midterm 2 (20%), Presentation (15%) and Group Project (15%).
• Make-up exams must be arranged before the exam date/time and will only be offered for UF-related conflicts and religious holidays.
• Unexcused absences from in-class exams results in a grade of 0.
• No Extensions   No Substitute Work

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91.00-100     A
89.00-90.99   A-
87.00-88.99   B+
81.00-86.99   B
79.00-80.99   B-
77.00-78.99   C+
71.00-76.99   C
69.00-70.99   C-
67.00-68.99   D+
61.00-66.99   D
60.00-60.99   D-
0-59.99       E
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A grade of C- is not a qualifying grade for major, minor, Gen Ed, or College Basic distribution credit. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:

http://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx
---AND---
http://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

UF POLICIES AND ASSISTANCE

Attendance:

Absences will be excused in accordance with UF policy. Acceptable excuses include illness, religious holidays, military obligation, & the 12-day rule. More info about attendance and make-up policies can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx.

Academic Honesty:

The University places a high premium on academic honesty. Accordingly, severe penalties are imposed for plagiarism and other instances of deception or fraud. The university's policies regarding intellectual honesty are detailed in the Student Honor Code (see https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/).

Counseling:

If you are ever having general issues with your coursework in any course or trouble in your personal life, please seek help from myself or another faculty member. I also encourage you to utilize the FREE and ANONYMOUS services of the UF Counseling and Wellness Center (352-392-1575; http://www.counseling.ufl.edu/cwc/).

Disabilities:
Students with disabilities can request classroom accommodations. They should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) and then bring the provided accommodation letter to the instructor.

Online Course Evaluations:

Students' feedback on the quality of instruction is extremely useful to the instructor to improve the quality of the course, therefore I strongly encourage you to conduct the online evaluation at

CALENDAR

After the first two weeks, the calendar has a regular pattern: "flash test" on Tuesday during the first period of class, introduction of a new topic in the second period on Tuesday, further analysis and examples on Thursday. The idea behind having tests on Tuesday is for the students to have more days to prepare for them. Midterms too are on Tuesdays for the same reason.

Lecture #	Date	Topic	Readings
1	Aug 21	Syllabus + Choice theory under certainty	Ch.2 (if needed)
2	Aug 23	Normal form games: theory and applications	Ch.5.1 - 5.2
3	Aug 28	Nash equilibria and solution mechanisms	Ch.5.4 - 5.5 - 5.6 - 5.12
4	Aug 30	Constrained optimization and comparative statics	Ch.5.9 - 5.11
5	Sep 4	HOLIDAY	
6	Sep 6	**TEST on Ch.5** Extensive form Games: theory	Ch.7.1 - 7.2 - 7.3
7	Sep 11	**TEST on Ch. 7** Coalitional Games and the Core: theory	Readings provided in class
8	Sep 13	**DEADLINE choice of groups for presentation** Coalitional Games and the Core: applications	
9	Sep 18	**TEST on Coalitional Games** Introduction to choice theory under uncertainty	Ch.3
10	Sep 20	Bayesian Games	Ch.6.1 - 6.8
11	Sep 25	**TEST on Ch.6** Extensive form games under uncertainty	Ch.8.1
12	Sep 27	Signaling games and applications	Ch.8.2
13	Oct 2	**TEST on Ch.8** Repeated games: theory	Ch.9.1 through Ch.9.5
14	Oct 4	**DEADLINE choice first part of presentation** Repeated games: applications	
15	Oct 9	**First Midterm**	
16	Oct 11	Introduction to Bargaining Theory	Ch.10 (selected parts)
17	Oct 16	**TEST on Ch.10** Social Choice Theory	Ch.4
18	Oct 18	Introduction to Mechanism Design	Ch.11.1 - 11.2
19	Oct 23	**TEST on Ch.11.1-2 and Ch.4** Incentive Compatibility and Individual Rationality	Ch.11.6

20	Oct 25	Constrained Mechanism Design	Ch.11.7
21	Oct 30	**TEST on Ch.11.6-7** Mechanism Design and Signaling Games: theory	Ch.11.8
22	Nov 1	Mechanism Design and Signaling Games: applications	
23	Nov 6	**TEST on Ch.11.8** Auction theory: theory	Ch.11.4
24	Nov 8	Auction theory: applications	
25	Nov 13	**TEST on Ch.11.4** Evolutionary Equilibria	Readings provided in class
26	Nov 15	**DEADLINE choice second part of presentation** Correlated Equilibria	Readings provided in class
27	Nov 20	Stable matching models	Readings provided in class
	Nov 22	HOLIDAY	
28	Nov 27	**Presentations**	
29	Nov 29	**Presentations**	
30	Dec 4	**Second Midterm**	

IMPORTANT: the textbook contains many sub-chapters with examples and applications of the different types of games and solution mechanisms. While there will not be time to cover all of them, I will select some of them depending on the pace of the class and the time available. Feel free to read these extra sections to gain a better understanding of the applications of game theory to real life issues.