Game Theory and Applications Syllabus

(ECO 4400, Spring 2019)

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Course Prerequisites: ECO 3101 and MAC 2233 (or higher)

Textbook: Harrington, J.E., *Games, Strategies, and Decision Making*, 2nd edition, Worth Publishers: Macmillan Ed., 2015.

Canvas Course Website: The website is used mainly to post some resources for the course. Most importantly, I will post tables/graphs/matrices from the book that we will use in our analysis in class, and it will be very useful for you to download these and have them in class. Second, I will post answers to the end-of-chapter problems in the textbook (more on this below). Last, I will post things like the syllabus and answers to the midterms.

About this Course: We study the basic framework and principles of classic game theory and apply these to a variety of strategic problems. The realm of game theory concerns settings having decision makers preferred (strategy) choices depend on others' (strategy) choices. A variety of environments have this property including economic problems, political competition, social interactions, international relations, military choices, and sports and parlor games. While this is a course in the economics program and we examine many economic problems, a number of applications we examine are not classic economic problems. This is a course in applied theory. Game theory is a branch of mathematics. As such, the course is moderately (perhaps quite) technical. We will use differential calculus at times (to solve continuous optimization problems), and sometimes calculate expected values (when a decision maker's payoff is uncertain).

Learning Game Theory: We will work though many examples of games in class that illustrate how to apply the principles of game theory. It is one thing to follow what we do in class and quite another to do it yourself. It is *essential* to carefully read the book (multiple times), study, and do problems to learn game theory. It is not a matter of applying a bunch of formulas. I will regularly list problems in the book to do, all with answers available (either in the book itself or at the course website). Sometimes it's easy; sometimes it's not.

Comments on Textbook: The textbook is far and away the best for a serious first course in game theory. It is extremely well written, comprehensive, and has huge number of good examples and problems. I will follow it quite closely in teaching this class. A caveat about the book is that some of the examples

involve stereotyped players, which the author makes clear are stereotyped and not to be taken seriously.

Topical Outline, Tentative Timing,[1] and Textbook Reading[2]:

Topic 1: Introduction, Setting up Games, Rationality and Analyzing Games with Just Rationality
~ 4 classes; Reading: Chapters 1,2, & 3

Topic 2: Nash Equilibrium and Discrete Games
~ 4 ½ classes; Reading: Chapters 4 & 5

Midterm 1: Feb. 11

Topic 3: Nash Equilibrium and Continuous Games
~ 3 classes; Reading: Chapter 6

Topic 4: Mixed Strategies
~ 2 ½ classes; Reading: Chapter 7

Topic 5: Sequential Games with Perfect Information
~ 4 classes; Reading: Chapter 8

Midterm 2: March 25

Topic 6: Sequential Games with Imperfect Information
~ 4 classes; Reading: Chapter 9 (skip 9.5); Chapter 10, just pp. 359-368

Topic 7: Repeated Play
~ 4 classes; Reading: Chapter 13; Chapter 14 (skip 14.5)

Final Exam: April 30, 3:00 – 5:00pm

Grading: The course grade is determined by the performance on the three equally weighted non-cumulative exams (see above for dates). I will consider exceptional classroom participation in determining borderline grades.

Make-up Policy: Students are permitted to make up exams only for good (and documented) medical reasons or real (and documented) family emergencies.

[1]The classes devoted to each topic are estimates. This is the first time I have taught this course. I will keep you informed as to where we are. I will adapt the coverage if we fall behind. We will stick to the exam dates unless something extraordinary happens.
[2] You are not expected to read any of the appendices to the assigned chapters.

Classroom Expectations:

- **Attendance is required.** Students are expected to be punctual in class attendance and remain in the classroom for the entire class session, unless an urgent need arises or prior arrangements have been made with the instructor.

- Students are expected to arrive for class prepared to meet classroom obligations and to devote full attention and commitment to the work of that class, as well as to actively participate in the class.

- **Laptops and other electronic devices should not be turned on**. **If you take notes on your laptop, clear this with me.**

- I hold myself to the same standards of behavior that I expect of students!

Honor Code: It goes without saying that we adhere to and expect adherence to the Honor Code of the University of Florida.

Students with Disabilities: We are committed to providing accommodations to students with disabilities following the guidelines and procedures of the University of Florida policies.