# ECON 490 (M3) Spring 2018
# Game Theory

University of Illinois at Urbana-Champaign
College of Liberal Arts & Sciences
Department of Economics

Instructor: Bei Yang
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Lectures: MW 12:30pm – 1:50pm, 215 David Kinley Hall
Office Hours: Right after the class, or by appointment

This course introduces students to the core concepts in game theory. Game theory is a beautiful and useful field of study. To truly understand it, one needs to master the underlying theoretical concepts as well as the art of applying them to the real-world problems at hand. This course put more emphasis on understanding the theory, while the skills of applying it are to be developed through a series of problem-set questions.

The game theory in its nature is abstract. We are going to go through some simple and artificial examples to better understand its meaning. However, this course is not factual-based, nor does it requires you to memorize formulas in order to perform calculations. Instead, it requires constant thinking and interpretations. From my experience, the type of thinking involved when studying game theory is similar to that when one constructs mathematical proofs.

Through the study of this course, students are expected to have solid understanding of the most central ideas and concepts in game theory so that one can further explore the game theory by oneself or through the study in the graduate school. In addition, students should be able to obtain some refined skills of applying game theory to the real-world problems.

Prerequisite: Calculus I. (Solid understanding of the basic concepts such as sets, functions, limits etc., is very useful for understanding the concepts and ideas in game theory).

## Textbook:

Games Theory – An Introduction, by Steven Tadelis (Required).

## Course Grade:

| | |
|---|---|
| Problem sets | 40% |
| Midterm Exam (March 5th) | 30% |
| Final Exam | 30% |

The total grade is the weighted average score of the above activities. The scale used to assign letter grades will be established at the end of the semester. A "+/-" scale will be used. Grading on a curve remains a possibility depending on the actual difficulty and class performance of the activities.

## Attendance:

You are responsible for all materials covered in class and all announcements made during class time concerning course procedures.

## Reading:

You are expected to read the textbook before the class (see the List of Topics in the last page for readings needed for each class). Additional readings may also be assigned in class.

## Assignments:

There will be two types of assignments in this course: exercises and problem sets. The exercise questions are picked from the textbook and to be assigned during the class. These questions help you to improve the understanding of the materials covered in class. It is thus a very important and necessary part of the learning process. I put trust in your part to spend reasonable efforts on solving these questions in a regular basis, and therefore they are not to be graded.

The problem sets are consisted of two parts: questions in a more closed-form to check your understanding of the theory and more open-ended questions for which you will gradually learn to build a game-theoretic model for a problem of your choice from a list of problems. I strongly recommend working in a group of three students for these problem sets. Each group only need to submit one copy of the problem set at the due date. **Problem set answers must be typed (hand-drawn diagrams and figures are okay). No late submission is accepted.**

## Exams:

There will be one midterm exam and one take-home final exam. The midterm exam will be held in class during the regular lecture time. Any absence must be approved before the exam. The take-home final exam will be assigned in class. **You may discuss with your classmates, but each of you must independently write your own answers. The take-home final exam must be typed and no late submission is accepted.**

## Academic Integrity:

"The University has the responsibility for maintaining academic integrity so as to protect the quality of education and research on our campus and to protect those who depend upon our integrity. It is the responsibility of each student to refrain from infractions of academic integrity, from conduct that may lead to suspicion of such infractions, and from conduct that aids others in such infractions."

In other words: Do not cheat. Do not help someone else to cheat. Are you unsure about what counts as cheating? Our university's standards of academic integrity specify that "ignorance is not a defense"! You can inform yourself about standards of academic integrity, and penalties for violating those standards, by consulting the Code of Policies and Regulations.

## Accommodations:

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES you may visit 1207 S. Oak St., Champaign, call 333-4603 (V/TTY), or e-mail a message to disability@uiuc.edu.

Please come to my office hours or make an appointment with me to discuss possible accommodations in class and for assignments. In particular, accommodations for exams can only be provided if requests are made at least ONE WEEK BEFORE the exam date.

## Emergency Response Recommendations:

The university maintains guidelines for emergency responses. A list of recommendations when to evacuate and when to find shelter are available at:

http://illinois.edu/cms/2251/general_emergency_response_recommendations_8_16_13_final.docx

Floor plans for specific buildings are available at:
http://police.illinois.edu/emergencyplanning/floorplans/

## List of Topics (subject to change):

| Topics | Reading |
|---|---|
| Game Representations and Strategies | ST[1]: 3, 6.1, 7.1, 7.2 |
| Decision-theoretical Foundations | ST: 1, 2 |
| Rationalizability and Dominance | ST: 4 |
| Nash Equilibrium | ST: 5, 6.2 – 6.4 |
| Theories of Equilibrium Refinements | Handouts |
| Sequential Rationality and Subgame Perfect Equilibrium | ST: 8, 9 |
| Incomplete Information and Bayesian Games | ST: 12 |
| Bayesian Nash Equilibrium | ST: 12 + Handouts |
| Refinements of Bayesian Nash Equilibrium | ST: 15 |
| * Repeated Games | ST: 10 |
| * Coalitions in Cooperative Games | Handouts |
| * Games with Communication | ST: 16, 18 |
| ** Implementation Theory | ST: 14 + Handouts |
| ** Evolutionary Game Theory | Handouts |
| ** Nash's Bargaining Solution | ST: 11 + Handouts |

[1] ST: Textbook sections;

*: We are going to cover these topics if time allows;

**: Advanced topics. Depending on the actual progress, we may cover one or more of these topics in class.