CUR 412 – Game Theory and its Applications

Course Syllabus

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Course Website: http://rncarpio.com/teaching/CUR412
Lecture Room & Time: Boxue 208, Friday 18:30-20:00

Online Teaching: Due to the Coronavirus outbreak, we will spend some part of the course online. Please take the following steps:

1. If you are not a member of the WeChat group CUR412-2020 already, contact me and I will add you.
2. Please go to http://zoom.com.cn and register (it's free). Note that there should be a ".cn" at the end. We will be using this app for live video meetings. After registering, you can download the Zoom.com app for mobile, Windows or Mac. **My Zoom.com meeting ID is 642-597-7540**; please copy this down.

Course Description: Game theory is the study of rational behavior in strategically interdependent situations, that is, situations where the results of your actions depend on what other agents do (and vice versa). It is the foundation of economic theory and has many applications in economics, business, political science, and biology.

This course is an introduction to the ideas and concepts behind game theory. We will study the ways in which economists formally specify a multi-agent situation (called a *game*), and the ways of determining the outcome of the situation, assuming all agents are behaving rationally. We will see examples of game theory applied to a variety of fields.

The language of instruction for this course is English.

Prerequisites: You should have taken intermediate microeconomics and be familiar with probability theory.

Course Website: http://rncarpio.com/teaching/CUR412

Announcements, homeworks, and other course materials will be posted here.

Textbook: The primary textbook is *An Introduction to Game Theory* (2003) by Martin Osborne, published by Oxford University Press. Chapters 1-3 of the textbook are available at the textbook website: http://www.economics.utoronto.ca/osborne/igt/

There is a Chinese translation of the textbook; it is highly recommended that you get the Chinese version if you find you are having trouble with the English in the textbook.

Games of Strategy, 2nd Ed. by Avinash Dixit and Susan Skeath is useful as a secondary textbook; it is less mathematical and provides more intuition.

Grading: Course grades will be determined by homeworks, a midterm exam, and a final exam.

Homework	15%
Midterm Exam	35%
Final Exam	50%

Homeworks:

- There will be 5 graded homework assignments. Assignments will be posted on the course website.
- You are allowed to work on the concepts behind the problem sets in small groups, however everyone must *individually* write-up their own answers; thus the answers to every problem set should be unique.
- The problems on the exams will be similar to those on the homeworks. The best way to prepare for the exams is to solve the homework problems by yourself.
- Late homeworks will get a 50% penalty.

Exams:

- All exams are closed-book.
- During exams, you may NOT use your cell phone as a calculator. You must bring a standard scientific calculator without programming capabilities.
- A make-up exam will be granted only in case of properly documented emergencies (e.g. a doctor's note or legal documentation).

Course Outline: (not all topics may be covered, depending on time constraints)

1. Introduction and Motivation (Chapter 1)
2. Static Games (Chapter 2)
3. Nash Equilibrium: Theory (Chapter 2)
4. Nash Equilibrium: Applications (Chapter 3)
5. Mixed Strategies & Mixed Strategy Equilibrium (Chapter 4)
6. Extensive Form Games (Chapter 5)
7. Sequential Games and Backwards Induction (Chapter 6-7)
8. Games with Imperfect Information (Chapter 10)
9. Repeated Games (Chapter 14)