



Fall 2009 IE 675: Game Theory

Time: 3:00 PM - 4:20 PM Monday, Wednesday
Place: Room 260 Capen, North Campus
Web: Please use UBLearn to assess all course information

INSTRUCTOR

Jun Zhuang, 403 Bell Hall
E-mail: jzhuang@buffalo.edu (*Please put "IE 675" on the subject of all your emails*)
Phone: 716.645.2357 X 2475 (Office)
Office hours: 1:00-2:30 PM Monday, 9:30 AM-10:30 AM Wednesday

TEACHING ASSISTANT

Name, TBA Bell Hall
E-mail: NAME@buffalo.edu
Office hours: TBA

REFERENCES

There is no required textbook but the followings are recommended. Course slides will be distributed through UBLearn. Several journal articles will be assigned for reading and discussion, throughout the semester.

- ★ *Games of strategy*, By Avinash K. Dixit, Susan Skeath, and Susan Skeath, The third edition, 2009, W. W. Norton.
- ★ *Game theory*, By Drew Fudenberg and Jean Tirole, 1991, MIT Press.
- ★ *A First course in optimization theory*, By Rangarajan K Sundaram, The ninth edition, 2005, Cambridge University Press.
- ★ *Microeconomic theory*, By Jerry R. Green, Andreu Mas-Colell, and Michael D. Whinston, 1995, Oxford University Press.
- ★ *Repeated games and reputations: long-run relationships*, By George Joseph Mailath and Larry Samuelson, 2006, Oxford University Press US.

CATALOG DESCRIPTION

A development of the mathematical theory of conflict, cooperation competition, and coercion among economic decision-makers. Classical n-person game theory and its relationship to linear programming. Dynamic cooperative games, their applications to decentralized control systems and the analysis of the behavior of decision-makers in organizations.

PREREQUISITES

Graduate student status; and serious interests in conducting a research/project related to game theory.

COURSE GRADING

Homework = 30%; Project written proposal = 10%; Project oral proposal presentation = 10%; Project oral mid-term presentation = 10%; Project oral final presentation = 15%; Project written final report = 25%. There is no strict cut-offs for final letter grades. However, the instructor expects the average grade be A-.

HOMEWORK

There will be about 4-6 homework in this semester. Homework must be turned in by the end of the class period in which it is due. Provide your full name and student ID number for each of the homework that you submit. Late homework will not be accepted, except in extenuating circumstances (e.g., family emergency, illness, etc.) with official documents.

You are encouraged to join with other students in discussing the course, including homework. This is especially useful if you have first tried to solve the problem on your own, and focus on understanding the reasons for any differences between your answer and someone else's approach, rather than just copying the answer that someone else got. Note, however, that when you write up the work that you hand in, you should do so on your own. You are strongly recommended to turn in a computer-generated (e.g., L^AT_EX, MS Word) homework if possible.

PROJECT

Each student works on a separate project. Project is an essential part for this class, which consists of five parts: written proposal, oral proposal presentation, oral mid-term presentation, oral final-term presentation, and written final report. Each student is required to discuss with the instructor about the possible research topics related to game theory in the beginning of the semester. Students are also strongly encouraged to discuss with their own academic advisors to find a suitable research topic related to game theory. The written proposal is due by the end of the fifth week and the written final report is due in the end of the semester. All three presentations will be scheduled in class and evaluated by both students and the instructor. Project gradings will be based on the (oral and written) presentation skills, the quality of the research, and the probability of getting published in a scholarly journal.

ATTENDANCE

Although positively correlated with your homework and project grades, attendance at the lectures will not be directly included in your final grade. However, attendance is fundamental to the course, so if you don't come to class, you are giving yourself a disadvantage. Absenteeism can also be a sign of illness or other serious problems; don't hesitate to email or call to discuss the reasons for any absences. If you need help, please let me know, and I will try to connect you with the appropriate campus resources.

OFFICE HOURS

To be fair to all of the students and to the colleagues that we work with, please cooperate with us in respecting the office hours of the TA and the professor. However, individual appointments can be made, if the posted office hours are insufficient or inconvenient. You may email the instructor or TA at any time to discuss your questions by email, or to set up an appointment. I will respond as soon as possible, but you should be aware that I do not always check my email on the evenings and weekends, or when I am traveling. If you need to reach me on an urgent basis (e.g., before an exam), you can also try leaving a message on my voice mail with information on when and how I can reach you by phone.

UNIVERSITY POLICY ON ACADEMIC INTEGRITY

All work must be your own. Plagiarism is never allowed. If any student is found in violation of maintaining academic integrity, sanctions will be imposed. This can be as severe as receiving an F in the course. Especially flagrant violations will be considered under formal review proceedings, which can call for harsher sanctions including expulsion from the University. If you ever have any questions or concerns regarding the policy, particularly as it related to this course, see the instructor.

COURSE OUTLINE

There are twenty-seven 80-min lectures in the fifteen instruction weeks (August 31–December 9), excluding three UB holidays: 09/07 (Labor Day); 09/28 (Yom Kippur); and 11/25 (Fall Recess). The following schedule for those 27 lectures are tentative and subject to change:

- ★ Individual Decision Making (4 lectures)
 - ✓ Preferences and utilities
 - ✓ Optimization with and without constraints
 - ✓ Decision making under uncertainty
 - ✓ Markov decision process/dynamic programming
- ★ Group Decision Making (6 lectures)
 - ✓ Best responses and Nash equilibrium
 - ✓ Normal-form and extensive-form games
 - ✓ Simultaneous and sequential games
 - ✓ Complete and incomplete information games
 - ✓ Cooperative and non-cooperative games
 - ✓ Zero-sum and non-zero-sum games
 - ✓ Discrete and continuous games
- ★ Student Project Proposal Presentation (1 lecture)
- ★ Advanced Topics in Game Theory (6 lectures)
 - ✓ Games and Operations Research
 - ✓ Mechanism design, signaling games, and screening games
 - ✓ Repeated games and reputation
 - ✓ Differential games
 - ✓ Behavioral game theory
 - ✓ Evolutionary game theory
- ★ Student Project Mid-Term Presentation (2 lectures)
- ★ Research related to Game Theory (5 lectures)
 - ✓ Supply chain games
 - ✓ Transportation games
 - ✓ Health care games
 - ✓ Homeland security and emergency response games
 - ✓ International relations: conflicts and collaboration games
- ★ Student Project Final Presentation (3 lectures)