

ISyE 8813C

Game Theory

Fall 2013

Administrative Info

Instructor: Anton J. Kleywegt
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Class Room: IC107

Class Times: Tuesdays & Thursdays 9:35am–10:55am

Description:

The course covers foundational material in both non-cooperative and cooperative game theory. The major objective of the class will be to develop a better understanding of the basic theoretical results in game theory and their proofs. Significant time will be spent on the mathematical material, beyond the prerequisite knowledge for the class, that underly the proofs of important results. Thus we will not spend much time on applications, although we may devote a few lectures on some applications such as economic models, auction theory, or biological models, depending on the interests of class participants. We will also briefly explore some of the more modern topics in game theory, such as dynamical models of learning in games.

Objectives of the course are

- to develop a familiarity with basic results in game theory;
- to develop a familiarity with mathematical tools and proof techniques used in game theory;
- to understand the assumptions and the limitations of results in game theory, and the questions that result from those;
- to develop the ability to read papers involving game theory, and to understand the technical parts of the papers.

Prerequisites:

Previous exposure to real analysis will be important (concepts such as supremum, infimum, convergence, continuity, contraction mapping). The extensions of some results use measure theory. Familiarity with convex sets and convex functions will be important.

Textbook:

Myerson, R.B., "Game Theory: Analysis of Conflict", Harvard University Press, 2002.

Border, K. C., *Fixed Point Theorems with Applications to Economics and Game Theory*, Cambridge University Press, Cambridge, 1985.

References:

Aliprantis, C. D. and Chakrabarti, S. K., *Games and Decision Making*, Oxford University Press, New York, 2000.

Dixit, A. and Skeath, S., *Games of Strategy*, W.W. Norton & Company, New York, 1999.

Filar, J. A. and Vrieze, K., *Competitive Markov Decision Processes*, Springer-Verlag, New York, 1996.

Friedman, J. W., *Game Theory with Applications to Economics*, Oxford University Press, New York, 1986.

Friedman, J. W., *Oligopoly and the Theory of Games*, North-Holland, Amsterdam, 1977.

Fudenberg, D. and Levine, D. K., *The Theory of Learning in Games*, MIT Press, Cambridge, MA, 1998.

Fudenberg, D. and Tirole, J., *Game Theory*, MIT Press, Cambridge, MA, 1991.

Garcia, C. B. and Zangwill, W. I., *Pathways to Solutions, Fixed Points, and Equilibria*, Prentice-Hall, 1981.

Gibbons, R., *Game Theory for Applied Economists*, Princeton University Press, Princeton, 1992.

Jones, A. J., *Game Theory: Mathematical Models of Conflict*, Chichester, England, 2000.

Kreps, D. M., *Game Theory and Economic Modelling*, Oxford University Press, Oxford, 1990.

Luce, R. D. and Raiffa, H., *Games and Decisions*, Dover Publications, New York, 1957.

Mas-Colell, A. and Whinston, M. D. and Green, J. R., *Microeconomic Theory*, Oxford University Press, New York, 1995.

Owen, G., *Game Theory*, Academic Press, San Diego, 1995.

Rapoport, A., *N-Person Game Theory*, University of Michigan Press, Ann Arbor, 1970.

Shubik, M., *Game Theory in the Social Sciences: Concepts and Solutions*, MIT Press, Cambridge, MA, 1982.

Von Neumann, J. and Morgenstern, O., *Theory of Games and Economic Behavior*, Princeton University Press, Princeton, 1980.

Vorobyev, N. N., *Game Theory: Lectures for Economists and Systems Scientists*, Springer-Verlag, New York, 1977.

Grading:

- Homework: 30%
- Midterm exam: 30%
- Final exam: 40%

Homework:

Homework will be assigned approximately once every two weeks. You should start working on each homework early, that way you will have time to ask questions in class before the homework is due. Late homework will be accepted only in case of unavoidable occurrences, such as illness or death in the family. You are encouraged to discuss homework and learn from each other, but each person must submit his/her own work, unless the homework specifically indicates that you should work in groups. Any queries on homework grades must be submitted in writing to the instructor, together with the homework in question.

Exams:

Exams will cover material discussed in class, as well as reading assignments and homeworks. The exams will be comprehensive. The midterm exam is scheduled for Thursday October 17, 2013, in class. The midterm exam will be closed book. Make-up exams will be scheduled only in case of unavoidable emergencies. Personal business, such as interviews and travel arrangements are not sufficient reason to warrant a make-up exam or an incomplete grade. All unexcused absences will result in an exam grade of zero. If you have a good reason (unavoidable emergency) for missing an exam, then bring the instructor a letter from the dean of students stating that the reason for missing the exam is legitimate and has been verified, and a make-up exam will be scheduled. If your documentation is fraudulent in any way, or if you falsify in any way your reasons for missing an exam, you will receive a grade of F in the course. Any queries on exam grades must be submitted in writing to the instructor, together with the exam in question. The final examination will be cumulative.

Quiz and Exam Rules:

- All exams and quizzes are closed-book and closed-notes.
- Unless you are explicitly told that a calculator is allowed on a quiz or exam, there should not be any calculator within your reach during a quiz or exam. If you are explicitly told that a calculator is allowed on a quiz or exam, then you may use a calculator that can only function as a calculator, and nothing else. No communication device, such as a mobile phone or device that facilitates access to the internet, may be within your reach during a quiz or an exam, not even if you use it as a calculator. In most quizzes and exams no calculator will be allowed.
- You may bring a wristwatch that can function as a watch and nothing else. You may not use any other electronic equipment (unless you are explicitly told that a calculator is allowed). In particular, no electronic equipment that allows you to communicate with others, either inside or outside the exam room, or make web queries, or store notes, may be within your reach during a quiz or an exam, not even if you use it to check the time.
- You will be asked to leave your bags with all your materials that are not allowed during exams in the front of the class room during exams.
- You will not be permitted to go to the restroom during a quiz or exam. No exceptions, so be sure to go before class. If you have a medical reason why this rule is a problem for you, then you have to arrange in advance with the dean of students to take the exam proctored by their personnel.
- Cheating on quizzes and exams will not be tolerated in this course. You may not:
 - Attempt to look at someone else's exam (even for a second).
 - Copy from someone else's exam,
 - Let someone else copy from your exam. (Cover your exam!)
 - Bring or look at any information during the exam (e.g. on your person).
 - Wear caps or headphones/earbuds of any kind.
 - Use unacceptable electronic equipment.
 - Undertake any other activity that can be construed as giving/receiving or attempting to give/receive help during the exam.

If you violate any of these rules, then you will receive an F in the course.

Classroom Rules:

- No mobile phone use in the class. That means no talking, texting, checking email, surfing the internet, or any other mobile phone use in the class.
- No newspaper reading in the class.

- You may bring your laptops, tablets, or other electronic devices to class. However, no checking email or surfing the internet during class unless you are explicitly allowed to do so. If you need to check email or surf the internet during class time, then you may leave the class room and do so outside the class room.

Academic Honor Code:

All course participants (myself, teaching assistant, and students) are expected and required to abide by the Georgia Tech Honor Code. Please familiarize yourself with the code, and use it to guide your conduct. Specifically, you must do your own work in all homework (unless the homework is specifically designated as a group homework), quizzes and exams. Any form of academic dishonesty, such as plagiarism, can result in a serious deduction from your final grade or even a grade of F in the course.