Game Theory
Carnegie Mellon University
Spring 2009

Instructor:

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Understanding how people should and do make decisions is an important study for a variety of different disciplines. Economics, sociology, philosophy, and even biology all attempt to understand the process of making decisions. Some decisions are made in a context where the outcomes are determined by a single person's choice and some random events. Other decisions are more complicated, they involve several different decision-makers all trying to do the best they can – but the best depends on what the other's do.

These so-called strategic situation surround us. Choosing investments, routes to the supermarket, and whether to honor a promise are all strategic choices and all are studied by game theory. This set of mathematical techniques attempts sometimes to predict people's decisions and at other times to justify them. This course focuses on this modeling. Along the way we will discuss it's philosophical foundations as well as its varied applications.

Required Texts:	Ken Binmore (2007) *Playing for Real: A Text on Game Theory* Oxford University Press
Course Requirements:	5 Homeworks due throughout the semester – dates to be announced in class* Attendance **and participation in class discussion** can positively influence your grade up to a full letter grade Graduate students will be given extra homework problems and will be required to attend a separate graduate student section.

(*) You are allowed to discuss the homework with one another in attempting to solve the problems, but each individual student must write up the answers independently. If you collaborated with another student in solving a particular problem **you must note who that student is and on which problems you collaborated**. Copying verbatim answers or failing to note collaboration constitutes academic dishonesty.

Reading Schedule

January 13	Introduction to game theory
January 15	No Class
January 20	Prisoner's dilemmas (Binmore pg 3 - 17)
January 22	An introduction to solution concepts (Binmore 17-32)
January 27	Extensive form and backward induction (Binmore 39-56)
January 29	Nim, Hex, and subgame perfection (Binmore 56-70)
February 3	Probability and expectation (Binmore 77-92)
February 5	Waiting game and Parcheesi (Binmore 93-103)
February 10	Strategic form and dominance in games (Binmore 143-157; Also 424-425)
February 12	Credibility, Threats and Backward induction (Binmore 157-168)
February 17	Mixed strategies and mixed strategy equilibria (Binmore 177-182)
February 19	Interpreting mixed strategies (Binmore 182-186)
February 24	Matrix Algebra and Geometry of mixtues (Binmore 186-199)
February 26	Cooperation and self-enforcing agreements (Binmore 199-207)
March 3	Zero sum games (Binmore 215-233)
March 5	Nash existence proof (Binmore 253-262)
March 10	No Class: Spring Break
March 12	No Class: Spring Break
March 17	Interpreting equilibria (Binmore 262-267)
March 19	Evolution and Learning (additional reading online)
March 24	Repeated games (Binmore 319-328)
March 26	Restricting strategy sets in repeated games (Binmore 328-340)
March 31	Applications to philosophy (Binmore 341-346)
April 2	Other equilibrium concepts (Binmore 407-418)
April 7	Signaling games (Binmore 418-426)
April 9	Cooperative game theory and bargaining (Binmore 459-470)
April 14	Nash bargaining solution (Binmore 471-486)
April 16	Noncooperative bargaining – Nash demand games (Binmore 493-502)
April 21	Commitment (Binmore 02-515)
April 23	Cooperative game theory and the core (Binmore 521-542)
April 28	Applications to ethics (Binmore 543-562)
April 30	Buffer