

Department of Economics
Johns Hopkins University

180.215 *Game Theory and the Social Sciences* (Spring 2012)

Prof. Joseph Harrington (410-516-7615, joe.harrington@jhu.edu)

Class Location and Time: Gilman 50 - T, Th 1:30-2:45

Office: Mergenthaler 437, Office Hours: T 3-5 and by appointment

Teaching Assistants

Weining Bao - Office Hours: M 2-3 and by appointment <wbao3@jhu.edu>

Hou Wang - Office Hours: Th 12-1 and by appointment <houwang@jhu.edu>

Xiaochen Xu - Office Hours: W 4-5 and by appointment <xxc0319@gmail.com>

Note: Any question regarding the grading of a problem set or exam should first be directed to the TA who graded it. If a resolution is not reached then you should come to the instructor.

The objective of this course is to introduce you to game-theoretic reasoning and show its usefulness in understanding social phenomena. While many mathematical tools have been developed for investigating physical phenomena, game theory is unique in that it was developed for investigating social phenomena (though it has since been adopted and adapted by evolutionary biologists). It is then not by accident that game theory is well-suited for analyzing the kinds of problems studied by social scientists. As stated by John von Neumann and Oskar Morgenstern in their seminal book *Theory of Games and Economic Behavior* (1944):

The importance of the social phenomena, the wealth and multiplicity of their manifestations, and the complexity of their structure, are at least equal to those in physics. It is therefore to be expected - or feared - that mathematical discoveries of a stature comparable to that of calculus will be needed in order to produce decisive success in this field. (Incidentally, it is in this spirit that our present efforts must be discounted.) *A fortiori* it is unlikely that a mere repetition of the tricks which served us so well in physics will do for the social phenomena too. The probability is very slim indeed, since it will be shown that we encounter in our discussions some mathematical problems which are quite different from those which occur in physical science.

Though the contribution of game theory to the social sciences is vastly smaller than the contribution of calculus to the physical sciences, it is still the case that game theory represents an important and essential step in the development of appropriate mathematical tools for analyzing social phenomena.

The only pre-requisites are a sincere intent to attend class on a regular basis and the ability to engage in a little mathematics without having an anxiety attack.

Required Book

Harrington, Joseph, *Games, Strategies, and Decision Making*, Worth Publishers, 2009. (ISBN-13: 978-0-716-6630-8, ISBN-10: 0-716-6630-2)

Course Requirements

Problem Sets (around six or seven in number) - 15%

Test #1 (tentative date: March 6th) - 25%

Test #2 (tentative date: April 17th) - 25%

Final Exam (Comprehensive, May 10th, 2-5pm) - 35%

Senior Option will be determined at the last class.

Problem Sets - Unless stated otherwise, a problem set is due one week after it is assigned. A problem set is considered "late" if it is not turned in at the start of class on the day it is due. A late problem set is penalized 50% while one that is turned in after answers have been distributed receives zero credit.

Class Schedule

- Introduction to Game Theory - Chapter 1
- Defining and Modelling a Game - Chapter 2
- Solving a Game: Eliminating Dominated Strategies - Chapter 3 (skip Appendix on Rationalizability)
- Solving a Game: Nash Equilibrium - Chapters 4, 5, 6.1-6.2
- Randomizing Your Play - Chapter 7 (skip 7.5)
- Sequential Play and Backward Induction - Chapters 8, 9
- Games of Incomplete Information - Chapters 10 (skip "Appendix: Auctions"), 11 (skip Brinksmanship example, "Appendix: Bayes' Rule and Updating Beliefs" is optional)
- Cooperation and Reputation - Chapters 13, 14.1-14.3, 15.3
- Games in Nature - Chapters 16.1-16.3, 17

Graduate Student Tutoring System: Doctoral economics students are available to tutor students for a fee in a one-on-one or small group setting. These students have taken graduate level courses or are conducting research in the subject area and may have been a past teaching assistant for this class. Please contact coordinator James Lake <jlake2@jhu.edu> for more information.