Stanford University
Dept. of Economics
Winter 2005
OH: Thu 9:00 - 10:30 AM

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Economics 160:
Game Theory and Economic Applications

Description

This course is an introduction to non-cooperative game theory. The course is aimed at providing the background required to comprehend many of the developments in economic theory that utilize game theory. The course is mathematically rigorous (more than Economics 51).

TA: Dan Quint. <dquint@Stanford.EDU>
Section will be determined after the first lecture.

Prerequisites

Economics 51 and one course each in calculus and probability, or the consent of the professor.

Requirements & Grades

Problem Sets: During the quarter students will be required to hand in 7 problem sets. The problem sets will be distributed on Thursdays and will be due IN CLASS on the following Tuesday.

Midterm: A midterm exam will be given on **February 1**

Final exam: A final exam will be given at the end of the quarter.

Final grade: The final grade will consist of **approximately** 20% problem sets, 30% midterm exam and 50% final exam. The approximation accounts for in class participation and improvement through the course.

NOTE: Both for problem sets and for exams you are **required** to give a brief, yet complete set of steps to clarify how you reached any of your final answers. **Extensions to deadlines, or rescheduling of exams, will generally not be granted except for very unusual circumstances.**

Readings

The course will be sufficiently self-contained, and will be supplemented by detailed class-notes that should meet the need for a textbook. They will appear on my web-page at: www.stanford.edu/~stadelis/ec_160_05.html.

Students might find the following books useful in supplementing the lectures, but they are by no means necessary and the course will not follow them closely:

1)   **Watson, Joel**. 2002. *Strategy: An Introduction to Game Theory*. Norton

2)   **Osborne, Martin**. 2004. *An Introduction to Game Theory*. Oxford

These books are **usually available** at the Stanford Book Store and on reserve in the Library. If there are delays I will supply material.

In addition to these two books, some other textbooks listed below may be helpful. In particular, the Fudenberg-Tirole book is a good source for an advanced and rigorous treatment of the material, but it may be somewhat above the level that students will be comfortable with. The recommended books are:

- **Gibbons, Robert**. 1992. *Game Theory for applied Economists*. Princeton: Princeton
  University Press. ISBN 0-691-00395-5 (PB)

- **Fudenberg, Drew and Jean Tirole**. 1991. *Game Theory*. Boston: The MIT Press. ISBN 0-262-06141-4

- **Rasmusen, Eric**. 1994. Second Edition. *Games and Information*. Basil Blackwell. ISBN 1-55786-502-7.

- **Morrow, James** D. 1994. *Game Theory*. Princeton: Princeton University Press.

Syllabus

Static Games of Complete Information

Lecture 1:   General introduction to the course.
              Normal form games in pure strategies and Matrix representation.

Lecture 2:   Solution concepts.
              Dominated strategies.
              Strict dominance in pure strategies.

Lecture 3:   Iterated Elimination of Strictly Dominated pure strategies.
              Beliefs, Best Responses and Rationalizability

Lecture 4   Nash Equilibrium in Pure strategies – definition and applications.

Lecture 5   Mixed strategies:
              Expected Utility
              Concept of mixed strategy Nash equilibrium
              Nash Equilibrium in mixed strategies: Existence.

Lecture 6   Mixed strategies (contn'd): Iterated Strict Dominance and
              Rationalizability.

Dynamic Games of Complete Information

Lecture 7   Extensive form games.
              Perfect and Imperfect Information.
              Normal form representation of Extensive form games.

Lecture 8:   Credibility and Subgame Perfect Equilibria
              Backward Induction

Lecture 9:   ** Midterm exam **

Lecture 10:   Multi-stage games

Lecture 11:   Repeated games and the Folk theorem

Lecture 12:   Strategic Sequential Bargaining

Static Games of Incomplete Information

Lecture 13:   Expected Utility Theory revisited
               Static Bayesian Games in normal and extensive form representations.

Lecture 14:   Bayesian Nash Equilibrium.

Lecture 15:   Applications of Bayesian Nash Equilibria to Auctions

Dynamic Games of Incomplete Information

Lecture 16:   Perfect Bayesian Equilibrium.

Lecture 17:   Signaling Games and Reputation.

Lecture 18:   Refinements of Perfect Bayesian Equilibrium

Lecture 19:   Review