

Syllabus - Economics 521

Course Description

Economics 521 is a semester long course on game theory, a discipline that provides a mathematical methodology for modeling and analyzing interactive decisions among multiple agents. Game theory has a wide range of applications in economics, political science, computer science, and other fields.

The approach of this course will be somewhere between that of a typical mathematics class and that of a typical economics class. Definitions will be stated formally, and arguments will be developed rigorously, as in a math class. At the same time, much of the course will be devoted to using game theory to understand applications in economics and other fields. Taking these applications as a starting point, we will develop an understanding of what constitutes a good mathematical model for addressing an economic question.

Prerequisites

The prerequisites for this class are Economics 301 (microeconomics) and Mathematics 222 (second semester calculus); having some background in probability theory (e.g., Economics 310) is also helpful. What is more important than any specific previous coursework is to have some degree of "mathematical sophistication", by which I mean a level of comfort with material presented in a formal fashion.

Reading Materials

The textbook for this class is

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

I will also post a typeset copy of my lecture notes on the course website.

Early in the course we will review some of the basics of probability theory. For this I have a reading from a textbook-in-progress that I am writing with a friend:

William H. Sandholm and Brett A. Saraniti (2011). *Vital Statistics: Probability and Statistics for Economic and Business Decisions*. To be published.

Other supplementary readings will come from

Itzhak Gilboa (2010). *Rational Choice*. MIT.
Vijay Krishna (2002). *Auction Theory*. Academic Press.

There are links to the readings on the course website.

Here are two game theory whose presentations are at a somewhat lower level than Osborne's.

Prajit K. Dutta (1999). *Strategies and Games: Theory and Practice*. MIT.
Joel Watson (2008). *Strategy: An Introduction to Game Theory*, 2nd ed. Norton.

To go deeper into the topics we consider, I recommend these graduate textbooks:

Drew Fudenberg and Jean Tirole (1991). *Game Theory*. MIT.
Roger Myerson (1991). *Game Theory: Analysis of Conflict*. Harvard.

Course Outline

- Unit 1: Preferences, utility, and rationality
- Unit 2: Dominance, iterated dominance, and rationalizability
- Unit 3: Pure strategy Nash equilibrium
- Unit 4: Mixed strategy Nash equilibrium and the minmax theorem
- Unit 5: Extensive form games with perfect information
- Unit 6: Bayesian games
- Unit 7: Auctions
- Unit 8: Extensive form games with imperfect information

Readings and Problem Sets

Details about the readings and problem sets for each unit will be posted on the course website. The solutions to some problems assigned from Osborne's book are posted on his website, which you can reach from the link on the course website (see below).

Exams

We will have two midterms during our scheduled class meetings, one on Tuesday, October 16, and the other on Thursday, November 15. The final exam will be held on Tuesday, December 18 from 12:25 to 2:25 pm in a room to be determined later.

Grading

The weights placed on problem sets, midterm 1, midterm 2, and the final will be 20%, 20%, 20%, and 40%, respectively.

Contact information

The Economics 521 website is

<http://www.ssc.wisc.edu/~whs/teaching/521>

My office is 7436 Social Science. You can reach me by e-mail at whs@ssc.wisc.edu or by phone at 263-3858. My office hours are on Thursdays from 11:15 to 12:15, on Fridays from 2:30 to 3:30, and by appointment.

The TA for this course is Man Wah Cheung. Her office is 6439 Social Science. She can be reached by e-mail at mcheung4@wisc.edu. Her office hours are on Mondays from 2:15 to 3:15, on Tuesdays from 11:00 to 12:00, and by appointment.