Prof. William H. Sandholm
Department of Economics
University of Wisconsin
Fall 2010

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.

Some supplementary readings for the first two units will come from

Itzhak Gilboa (2010). *Rational Choice*. MIT.

I list two other game theory whose presentations are at a slightly lower level than Osborne's next.

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: Bayesian games
Unit 6: Extensive form games with perfect information
Unit 7: Extensive form games with imperfect information
Unit 8*: Repeated games (* time permitting)

Units 1–7 will cover chapters 1–7 and 9–12 of Osborne and a few portions of Gilboa. If there is time for unit 8, it will cover some portion of chapters 14–15 of Osborne.

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 5, and the other on Tuesday, November 9. The final exam will be held on Tuesday, December 21 from 5:05 to 7:05 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 9:30 to 10:30, on Fridays from 2:30 to 3:30, and by appointment.

The TA for this course is Jiabin Wu. His office is 6413 Social Science. He can be reached by e-mail at jwu32@wisc.edu or by phone at 770–5808. His office hours are on Mondays and Wednesdays from 1:00–2:00 and by appointment.