ECOMMERCE AND COMPUTATIONAL ECONOMICS

Ecommerce and Computational Economics

T 11.45 - 1.45pm

Professor Simon Parsons, Brooklyn College

email: *parsons@sci.brooklyn.cuny.edu*
web: *http://www.sci.brooklyn.cuny.edu/~parsons*
aim: *profSimonParsons*

Class web page:
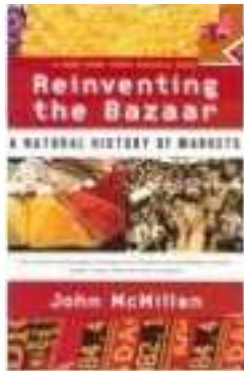*http://www.sci.brooklyn.cuny.edu/~parsons/courses/840-spring-2009/*

Format

- Some lectures.

- Some discussion.

- Some student presentations.

- Some project work.

"Textbook"

- There is no textbook as such, but the following books are good background for those who are interested.

  - Pretty light reading. Covers a lot of background and argument for well regulated market economies.

  - Reinventing the Bazaar: A Natural History of Markets by John McMillan, W. W. Norton & Company.

– More techical, but still very readable, introduction to auction theory and the 3G auctions.
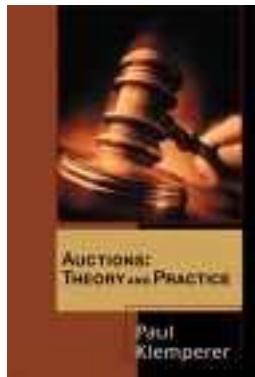
– Auctions: Theory and Practice (The Toulouse Lectures in Economics) by Paul Klemperer, Princeton University Press.

Office hours

- I won't have conventional office hours this semester — that never seems to work satisfactorily at the GC.

- However, I'll be around after most classes (usually in the cafeteria) and you are welcome to come talk to me then.

- I'll also be running *virtual* office hours, online (on AIM) under the screen name:

  profSimonParsons

  I'll be online Tuesday and Thursday nights, between 10 and 12 if you want to ask questions, or just come say "hi".

- Outside of that time, drop me an email and I'll get back to you as quick as I can.

Syllabus

- Simple auction types

- Auction theory

- Game theory (just a little).

- Mechanism design

- Social choice theory

- Double auctions and exchanges

- Computational methods

- Automated mechanism design

- Network markets

Simple auction types

- Most auction theory has looked at four basic auction types:

  – English auction.

  – Dutch auction.

  – First-price sealed-bid auction.

  – Second-price sealed-bid auction.

- We will be no exception, but we'll also mention some more obscure things.

Auction theory

- How do we answer questions about auctions like:

  - Which makes the most money?
  - Which is the most efficient?

- Need to make assumptions about the participants:

  - Know what they are willing to pay.but this value is not known to any one else.
  - Value does not depend on any other participant.
  - Risk neutral.
  - Basically the same as other participants.

- Revenue equivalence, winner's curse.

Game theory

- To do more than simple auction theory we need to look at some game theory.

- In particular games of imperfect information

  - i.e. don't know what the payoff is for others.

- So we'll take a brief look at enough game theory to handle these.

  - Bayesian Nash equilibrium

Mechanism design

- With some game theory behind us, we can look at mechanism design.

- Mechanism design does the opposite of classical game theory.

- We'll look at the positive results:

  - Vickrey-Clarke-Groves.
  - Revelation principle.

- And the negative results

  - Gibbard-Satterthwaite.
  - Hurwicz.

$\boxed{\text{Social choice theory}}$

- We think about mechanisms like so:

    – Mechanisms have a set of possible outcomes.

    – Participants have a set of preferences.

    – The outome is a function of the preferences.

- If you state preferences by *voting* not bidding, then we have social choice theory.

Double auctions and exchanges

- Auctions that involve both buyers and sellers.

  – Stock and commodity exchanges

- Widely used in practice, so lots of academic interest.

- Very hard to analyse.

  – Only results for extreme cases.

- Thus experimental investigations using human traders

  – Vernon Smith

Computational methods

- Computational methods allow us to go beyond experiments with human traders.

  - Bigger markets
  - "Statistical results"

- Of course there are assumptions — models of traders rather than real traders.

- We'll look at:

  - Internet pricing wars.
  - Santa Fe artificial stock market.
  - Trading strategies for double auctions.

Automated mechanism design

- Given:

  - Models of traders; and

  - A parameter space for a mechanism

  why not apply machine learning to find new kinds of auction?

- Cliff — balance between buyers and sellers.

- Phelps — pricing rule.

- Niu — shout-accepting rule.

- Can also *co-evolve* mechanism and traders.

Network markets

- What happens when we have multiple markets that compete?

- What happens when these mulitple markets are subject to *network effects*?
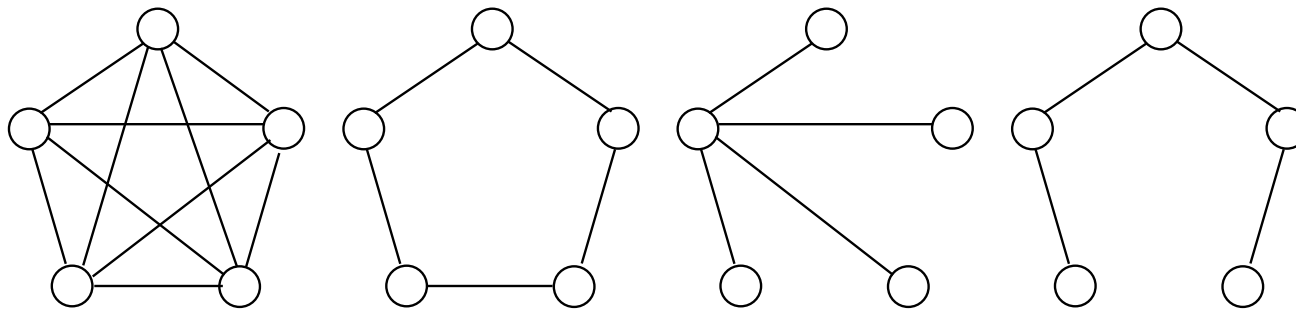
Project

- We have been working on a part of the *Trading Agent Competition*.

  – Market design game

- Partcipants design a double auction (starting from a set of standard components) that compete to make a profit, accumulate loyal traders, and complete as many transactions as possible.

- Singly or in groups you will design a market which will compete against the rest of the class and past entrants in the competition.

Assessment is based on

- Your presentation of research papers.

- The project.

- A final paper.