

Market Design

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A half-credit micro-economics course for second-year and above PhD students, Fall 2016

Seven lectures, Seminar B: 9-10:30am, Monday-Friday, 3-7 October; 10-1pm, Thursday, 13 October

Office hours, Villa La Fonte 112, are by appointment. You can reach me at pcramton@gmail.com.

Description

Market design combines auction and matching theory with behavioral and experimental economics to design innovative markets to better meet goals. Applications are seen in almost all markets and government programs that assign and sometimes price scarce resources. Market design research leads to a better understanding of the incentives that guide behavior. Applications include matching students to schools, interns to hospitals, and kidneys to patients. In settings where prices are used to motivate behavior, auction markets are developed to assign and price scarce resources. Applications include markets in mobile communications, electricity, financial securities, transportation, and emissions.

Market design takes as given that participants interact in the market to maximize their objectives given the market rules. The question we ask is, "Are the market rules best-suited to the market's objectives, or can they be improved?" This is an important and practical question. In nearly all cases, market rules can be improved and often the improvements can transform entire industries for the better.

Assessment

At the end of the course, you select a market design application of your choice and use the methods of the class and materials you find on the application to draft an essay of less than ten pages in pdf that develops some aspect of the market design application. You can focus on a narrow question or provide a broader summary of issues. Often, a narrower focus is best, but this is up to you. The paper can be done as a group project of two or three in addition to individually. For group papers, the maximum paper length is fifteen pages.

There are two steps to completing the paper. First, you draft a paper proposal of two pages or less, describing your topic/issue. Proposals in pdf are to be submitted by 11 pm on 19 October via Dropbox file request (link sent via email). Second, you will have two more weeks to execute your proposal and submit your final paper of ten pages or less in pdf by 11 pm on 2 November via Dropbox file request (link sent via email). Note that the proposal and paper lengths of two and ten pages are *maximums* (fifteen for group papers). It is perfectly fine if you can communicate your proposal in one page and paper in five pages. Quality is much more important than quantity. Indeed, once you make an initial draft of your paper, you would do well to review it and see if you can make the same points with fewer words. Doing so will improve the paper.

Materials

Lecture slides are posted on the course web page. They are updated periodically. Hit refresh on your browser to make sure you are viewing the most current slides.

Outline

- Introduction to market design
 - Economic engineering
 - Economics models
 - Testing theories
- One-sided matching
 - Top-trading cycles
- Two-sided matching
 - Deferred acceptance
- Introduction to auctions
- Equilibrium of games with incomplete information
- Mechanism design
- Auctioning many similar items
- Revenue equivalence and optimal auctions
- Applications
 - Electricity
 - Climate policy
 - Spectrum
 - Mobile communications
 - Transportation
 - Financial securities

Must read (in order of discussion)

Roth, Alvin E. (2002) [“The Economist as Engineer: Game Theory, Experimental Economics and Computation as Tools of Design Economics,”](#) *Econometrica*, 70:4, 1341–1378.

Camerer, Colin (2011) [“The Promise and Success of Lab-Field Generalizability in Experimental Economics: A Critical Reply to Levitt and List,”](#) in Fréchette, G. R. and A. Schotter (editors), *Handbook of Experimental Economic Methodology*, Chapter 14, Oxford University Press.

Bolton, Gary E., Ben Greiner, and Axel Ockenfels (2013) [“Engineering Trust – Reciprocity in the Production of Reputation Information,”](#) *Management Science*, 59, 265-285.

MacKay, David, Peter Cramton, Axel Ockenfels and Steven Stoff (2015) [“Price Carbon—I will if you will,”](#) *Nature*, 526, 315-316, 15 October.

Gale, Douglas, and Lloyd Shapley (1962) [“College Admissions and the Stability of Marriage,”](#) *American Mathematical Monthly*, 69, 9-15.

Roth, Alvin E. (2015), [Who Gets What and Why](#), HarperCollins, UK, Ch. 3, 8, and 9.

Kojima, Fuhito (2015) [“Recent Developments in Matching Theory and Their Applications,”](#) Working Paper, Stanford University.

Ausubel, Lawrence M., Peter Cramton, Marek Pycia, Marzena Rostek, and Marek Weretka (2014) [“Demand Reduction and Inefficiency in Multi-Unit Auctions,”](#) *Review of Economic Studies*, 81:4, 1366-1400.

Cramton, Peter and Linda Doyle (2016) [“An Open Access Wireless Market,”](#) Working Paper, University of Maryland, April.

[“The High-Frequency Trading Arms Race: Frequent Batch Auctions as a Market Design Response”](#) (with Eric Budish and John Shim), *Quarterly Journal of Economics*, 130:4, 1547–1621, November 2015. [[Presentation](#)]

Other references

Abulkadiroglu, Atila, and Tayfun Sonmez (1999) [“House allocation with existing tenants.”](#) *Journal of Economic Theory*, 88, 233-260.

Abulkadiroglu, Atila, and Tayfun Sonmez (2003) [“School Choice: A Mechanism Design Approach,”](#) *American Economic Review*, 93:3, 729-747.

Braun, Sebastian, Nadia Dwenger, Dorothea Kubler, and Alexander Westkamp (2014) [“Implementing Quotas in University Admissions,”](#) *Games and Economic Behavior*, 85, 232-251.

Cramton, Peter, Yoav Shoham, and Richard Steinberg (2006) [Combinatorial Auctions](#), MIT Press.

Fudenberg, Drew and Jean Tirole (1991) [Game Theory](#), MIT Press.

Gibbons, Robert (1992) [Game Theory for Applied Economists](#), Princeton University Press.

Hartline, Jason D., and Brendan Lucier (2015) [“Non-Optimal Mechanism Design,”](#) *American Economic Review*, 105:10, 3102-3124.

Krishna, Vijay (2009) [Auction Theory](#), Academic Press, Second Edition.

Levine, David (2012) [Is Behavioral Economics Doomed?](#), Open Press.

Milgrom, Paul (2004) [Putting Auction Theory to Work](#), Cambridge University Press.

Ockenfels, Axel and Alvin E. Roth (2006) [“Late and multiple bidding in second price internet auctions: Theory and evidence concerning different rules for ending an auction,”](#) *Games and Economic Behavior*, 55, 297–320.

Osborne, Martin and Ariel Rubinstein (1994) [A Course in Game Theory](#), MIT Press.