

Harvard University
Econ 2056 and Business 4150: Market Design
 Professors [Alvin E. Roth](#) and [Peter Coles](#), Spring 2007
 Fridays, 9am-noon in M16 Littauer

Assignment: One final paper. The objective of the final paper is to study an *existing* market or an environment with a potential role for a market, describe the relevant market design questions, and evaluate how the current market design works and/or propose improvements on the current design.

Handouts: Some handouts will be put in the Handout section of the course webpage, and some will have links from this syllabus.

Changes of plans: This syllabus is evolving. (This version: 3/15/07).

Lecture	Date	Preliminary Lecture Schedule: Topic & Readings
1 Al & Peter	2/2	<p>Introduction to the Class / Matching Theory I</p> <p>Roth, Alvin E. "The Economist as Engineer: Game Theory, Experimental Economics and Computation as Tools of Design Economics," <i>Econometrica</i>, 70, 4, July 2002, 1341-1378.</p> <p>Roth, A.E., "The Evolution of the Labor Market for Medical Interns and Residents: A Case Study in Game Theory," <i>Journal of Political Economy</i>, 92, 1984, 991-1016.</p> <p>Gale, David and Lloyd Shapley [1962], "College Admissions and the Stability of Marriage," <i>American Mathematical Monthly</i>, 69, 9-15.</p> <p>Roth, A.E. and M. Sotomayor <i>Two-Sided Matching: A Study in Game-Theoretic Modeling and Analysis</i>, Econometric Society Monograph Series, Cambridge University Press, 1990. (From Chapters 2-4)</p>
2 Al	2/9	<p>Matching Theory II—continued from previous lecture</p> <p>Structure of the set of stable matchings Incentives and equilibria</p>
3 Al	2/16	<p>Design of the NRMP algorithm and Unraveling of Transactions</p> <p>Design:</p> <p>Couples (from Roth and Sotomayor, Chapter 5)</p> <p>Roth, A. E. and Elliott Peranson, "The Redesign of the Matching Market for American Physicians: Some Engineering Aspects of</p>

		<p>Economic Design," <i>American Economic Review</i>, 89, 4, September, 1999, 748-780</p> <p>Unraveling:</p> <p>Selections from:</p> <p>Roth, A.E., "New Physicians: A Natural Experiment in Market Organization," <i>Science</i>, 250, 1990, 1524-1528.</p> <p>Roth, A.E., "A Natural Experiment in the Organization of Entry Level Labor Markets: Regional Markets for New Physicians and Surgeons in the U.K.," <i>American Economic Review</i>, vol. 81, June 1991, 415-440</p> <p>Roth, A.E. and X. Xing, "Jumping the Gun: Imperfections and Institutions Related to the Timing of Market Transactions," <i>American Economic Review</i>, 84, September, 1994, 992-1044.</p> <p>Niederle, Muriel and Alvin E. Roth, "Unraveling reduces the scope of an entry level labor market: Gastroenterology with and without a centralized match," <i>Journal of Political Economy</i>, 1. 111, no. 6, December 2003, 1342-1352. .</p> <p>Fréchette, Guillaume, Alvin E. Roth, and M. Utku Ünver, "Unraveling Yields Inefficient Matchings: Evidence from Post-Season College Football Bowls," March, 2004.</p>
<p>4 Al/Peter</p>	<p>2/23</p>	<p>Congestion and signaling</p> <p>Roth, A.E. and X. Xing, "Turnaround Time and Bottlenecks in Market Clearing: Decentralized Matching in the Market for Clinical Psychologists," <i>Journal of Political Economy</i>, 105, April 1997, 284-329</p> <p>Kagel, John H. and A.E. Roth, "The dynamics of reorganization in matching markets: A laboratory experiment motivated by a natural experiment," <i>Quarterly Journal of Economics</i>, February, 2000, 201-235.</p> <p>Coles, Peter and Muriel Niederle “Signaling in Matching Markets”</p>
<p>5 Al/Peter</p>	<p>3/2</p>	<p>Antitrust</p> <p>Niederle, Muriel, and Alvin E. Roth, "Relationship Between Wages and Presence of a Match in Medical Fellowships," <i>JAMA, Journal of the American Medical Association</i>, vol. 290, No. 9, September 3,</p>

		<p>2003, 1153-1154.</p> <p>Bulow, Jeremy and Levin, Jonathan D. "Matching and Price Competition" <i>American Economic Review</i>, forthcoming 2006. Available at http://www.stanford.edu/~jdlevin/Papers/Matching.pdf</p> <p>Comments/replies/extensions of Bulow and Levin by:</p> <ul style="list-style-type: none"> • Fuhito Kojima • Muriel Niederle • Siva Anantham and Jennifer Stack
<p>6 Peter</p>	<p>3/9</p>	<p>Generalized Matching Theory</p> <p>Kelso, Alexander S., Jr. and Vincent P. Crawford (1982), "Job Matching, Coalition Formation, and Gross Substitutes", <i>Econometrica</i>, 50, pp 1483-1504.</p> <p>Hatfield, John William and Milgrom, Paul R. (2005), "Matching with Contracts," <i>The American Economic Review</i>, Volume 95, Number 4, September 2005, pp. 913-935(23)</p> <p>Ostrovsky, Michael, "Stability in Supply Chain Networks," Revised, September 2005.</p>
<p>7 Peter</p>	<p>3/16</p>	<p>Auction Theory</p> <ul style="list-style-type: none"> - Feasible auction mechanisms (revelation principle, constraint reduction) - Payoff equivalence and Revenue Equivalence Theorem - Optimal auctions and revenue maximization. - Deviations from standard framework (affiliated values, risk aversion etc). - "Envelope approach" <p>Myerson, Roger (1981), Optimal Auction Design, <i>Math. Operations Research</i>, 6(1), 58-73.</p> <p>Bulow, Jeremy and John Roberts (1989) The Simple Economics of Optimal Auctions, <i>Journal of Political Economy</i>, 97(5), 1060-1090.</p> <p>Internet Ad Auctions</p> <p>Varian, Hal, "Position Auctions," (2006), <i>mimeo</i>.</p> <p>Edelman, Benjamin, Ostrovsky, Michael, and Schwartz, Michael Internet Advertising and the Generalized Second Price Auction: Selling Billions of Dollars Worth of Keywords, <i>American Economic</i></p>

Review, forthcoming, March 2007.

8 Peter/Al	3/23	Multi-unit auctions Bernheim, B. Douglas and Whinston, Michael D. (1986) "Menu Auctions, Resource Allocation, and Economic Influence," <i>Quarterly Journal of Economics</i> , 101(1) Ausubel, Larry and Paul Milgrom (2002), "Ascending Auctions with Package Bidding," <i>Frontiers of Theoretical Economics</i> , 1(1). Available at: http://www.ausubel.com/auction-papers/package-bidding-bepress.pdf Ebay Roth, Alvin E. and Axel Ockenfels , " Last-Minute Bidding and the Rules for Ending Second-Price Auctions: Evidence from eBay and Amazon Auctions on the Internet ," <i>American Economic Review</i> , 92 (4), September 2002, 1093-1103. (See Hal Varian's NY Times column on this work here). Ariely, Dan, Axel Ockenfels, and Alvin E. Roth, " An Experimental Analysis of Ending Rules in Internet Auctions ," <i>Rand Journal of Economics</i> , 36, 4, Winter 2005, 891-908.
9 X	3/30	SPRING BREAK
10	4/6	Empirical Models of Auctions Guest Speaker: Susan Athey. Athey, Susan and Haile, Phil, " Empirical Models of Auctions ," Invited lecture prepared for the Ninth World Congress of the Econometric Society, London, March 2006 (* required) Athey, Susan and Haile, Phil, " Nonparametric Approaches to Auctions ," <i>Handbook of Econometrics</i> , Volume 6, Forthcoming.
11	4/13	All-Pay Contests Siegel, Ron, " All-Pay Contests ," job market paper. Prediction Markets
12 Al	4/20	School Choice Abdulkadiroglu, Atila , and Tayfun Sönmez , " School Choice: A Mechanism Design Approach ", <i>American Economic Review</i> 93-3: 729-747, June 2003.

[Abdulkadiroglu, Atila](#) , [Parag A. Pathak](#), and [Alvin E. Roth](#), "[The New York City High School Match](#)," *American Economic Review, Papers and Proceedings*, 95,2, May, 2005, 364-367.

[Abdulkadiroglu, Atila](#) , [Parag A. Pathak](#), and Alvin E. Roth, "[Strategy-proofness versus Efficiency in Matching with Indifferences: Redesigning the NYC High School Match](#)," December, 2006.

[Abdulkadiroglu, Atila](#), [Parag A. Pathak](#), Alvin E. Roth, and [Tayfun Sönmez](#), "[The Boston Public School Match](#)," *American Economic Review, Papers and Proceedings*, 95,2, May, 2005, 368-371.

[Abdulkadiroglu, Atila](#), [Parag A. Pathak](#), Alvin E. Roth, and [Tayfun Sönmez](#), "[Changing the Boston School Choice Mechanism](#)," January, 2006.

Guest Speaker: Aytek Erdil

Erdil, Aytek and Ergin, Haluk, [What's the matter with tie-breaking? \(Improving efficiency in school choice\)](#), forthcoming AER

13
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4/27

Kidney Exchange

Roth, Alvin E., [Tayfun Sönmez](#), and [M. Utku Ünver](#), "[Kidney Exchange](#)," *Quarterly Journal of Economics*, 119, 2, May, 2004, 457-488.

(There have been several news stories about the work on implementing kidney exchange in New England that Sonmez and Unver and I are doing with local surgeons and tissue typing experts, especially Frank Delmonico and Susan Saidman. *The Boston Globe* ran a front page story called [Cross-donor system planned for region's kidney patients](#), June 5, 2004, and *The Wall Street Journal* ran a story on page B1 titled "[Easing the Kidney Shortage](#)," June 17, 2004. The SIAM News ran a [slightly more technical story](#). The National Science Foundation has a story highlighting the basic research underlying the organization of kidney exchange, [Kidney Exchange: A Life-Saving Application of Matching Theory](#). The organization we helped found is the [New England Program for Kidney Exchange \(NEPKE\)](#).)

Roth, Alvin E., [Tayfun Sonmez](#) , and [M. Utku Unver](#), "[Pairwise Kidney Exchange](#)," *Journal of Economic Theory*, 125, 2, December 2005, 151-188. (Originally published as NBER Paper w10698, August 2004.)

Roth, Alvin E., [Tayfun Sönmez](#) , and [M. Utku Ünver](#), "[A Kidney Exchange Clearinghouse in New England](#)" *American Economic Review, Papers and Proceedings*, 95,2, May, 2005, 376-380.

Roth, Alvin E., [Tayfun Sonmez](#) , and [M. Utku Unver](#), "[Efficient Kidney Exchange: Coincidence of Wants in a Market with](#)

		<p>Compatibility-Based Preferences," (May, 2005. NBER Paper w11402), <i>American Economic Review</i>, forthcoming. (And here is the online appendix with some of the proofs.)</p> <p>Roth, Alvin E. "Repugnance as a Constraint on Markets", <i>Journal of Economic Perspectives</i>, forthcoming.</p>
14 TBD	5/4	<p>Unsolved Market Design Problems</p> <p>Guest Speaker: Eric Budish</p> <p>Guest Speaker:</p>

Other Readings/Not Yet Scheduled

Avery, Christopher, Christine Jolls, Richard A. Posner, and Alvin E. Roth, "The New Market for Federal Judicial Law Clerks", *University of Chicago Law Review*, forthcoming.
<http://ssrn.com/abstract=959696>

Decentralized Markets

Avery, Christopher, Christine Jolls, Richard A. Posner, and Alvin E. Roth, "[The Market for Federal Judicial Law Clerks](#)" *University of Chicago Law Review*, 68, 3, Summer, 2001, 793-902.(online at SSRN)

Haruvy, Ernan, Alvin E. Roth, and M. Utku Ünver, "[The Dynamics of Law Clerk Matching: An Experimental and Computational Investigation of Proposals for Reform of the Market](#)," *Journal of Economic Dynamics and Control*, 30, 3 , March 2006, Pages 457-486. (With appendices and experimental instructions [here](#).)

Other readings, topics: Gastroenterology collapse and redesign, theoretical models (Li and Rosen, Hanna Halaburda,