

Market Design Syllabus

This class will cover the theory of matching markets with an emphasis on their application to real world problems. There will be some lectures on the basic theory and classical results, but we will try to focus on newer material and open questions arising from applications.

Lectures are MW: 11- 12:50 in Econ 106. Course materials will be posted on the website: <http://www.stanford.edu/~niederle/marketdesign>

The requirements for the course are to write a research paper. The paper is due at the end of the quarter, with *no* exceptions.

There is one book that we recommend for background reading.

A. Roth and M. Sotomayor, *Two-Sided Matching*, Cambridge Univ. Press, 1990.

The schedule for lectures is as follows. The schedule is still tentative, as I try to schedule 4 outside speakers. But the order of the lectures will roughly be as follows.

1, 2 Sept 26 and 28: Introduction and Theory

- Gale, David and Lloyd Shapley (1962), "College Admissions and the Stability of Marriage" *American Mathematical Monthly*, 69, 9-15.
- *Roth, Alvin E. "Deferred Acceptance Algorithms: History, Theory, Practice, and Open Questions," *International Journal of Game Theory* 36, 537-569.
- *Alvin E. Roth and Marilda Sotomayor (1990) *Two-Sided Matching: A Study in Game-Theoretic Modeling and Analysis*, *Econometric Society Monograph Series*, Cambridge University Press. Chapters 1,2,4, 5
- *Kagel, John H. and A.E. Roth, "The dynamics of reorganization in matching markets: A laboratory experiment motivated by a natural experiment," *Quarterly Journal of Economics*, February, 2000, 201-235.
- 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.", *American Economic Review*, vol. 81, June 1991, 415-440.
- Tayfun Sonmez, "Manipulation via Capacities in Two-Sided Matching Markets," *Journal of Economic Theory*, 1997, 77, 197-204.
- Tayfun Sonmez, "Can Pre-arranged Matches be Avoided in Two-Sided Matching Markets?" *Journal of Economic Theory*, 1999.

3 Oct 3: NRMP design: Large Markets

- *Kojima, F. and Pathak, P. A. (2008), "Incentives and Stability in Large Two-Sided Matching Markets," *American Economic Review* 99, pp 608-627.

- *Alvin E. Roth and Elliott Peranson (1999) “The Redesign of the Matching Market for American Physicians: Some Engineering Aspects of Economic Design,” *American Economic Review*, 89 (4) September, 748-780
- Immorlica, N. and Mahdian, M. (2005), “Marriage, Honesty, and Stability,” *SODA 2005*, pp. 53–62.

4 Oct 5: Congestion in Matching Markets

- Roth, Alvin E. “The Economist as Engineer: Game Theory, Experimental Economics and Computation as Tools of Design Economics,” *Econometrica*, 70, 4, July 2002, 1341- 1378.
- * Roth, A.E. and X. Xing "Turnaround Time and Bottlenecks in Market Clearing: Decentralized Matching in the Market for Clinical Psychologists, *Journal of Political Economy*, 105, April 1997, 284-329.

5, 6 Oct 10 & 12: Unraveling and decentralized matching:

- Roth, A. E. and Elliott Peranson, *The Redesign of the Matching Market for American Physicians: Some Engineering Aspects of Economic Design* *American Economic Review*, 89, 4, September, 1999, 748-780.
- * Roth, A.E. and X. Xing "Jumping the Gun: Imperfections and Institutions Related to the Timing of Market Transactions," *American Economic Review*, 84, September, 1994, 992-1044.
- Avery, Christopher, Christine Jolls, Richard A. Posner, and Alvin E. Roth (2001), “The Market for Federal Judicial Law Clerks”, *University of Chicago Law Review*, 68(3), Summer, 793-902.
- Avery, Christopher, Andrew Fairbanks and Richard Zeckhauser, *The Early Admissions Game: Joining the Elite*, Harvard University Press, Cambridge, MA 2003.
- Niederle, Muriel, and Alvin E. Roth, “Relationship Between Wages and Presence of a Match in Medical Fellowships”, *JAMA, Journal of the American Medical Association*, vol. 290, No. 9, September 3, 2003, 1153- 1154.
- Bulow, Jeremy and Jonathan Levin, "Matching and Price Competition," *American Economic Review*, 96(3), June 2006.
- Kamecke, Ulrich, "Wage Formation in a Centralized Matching Market," *International Economic Review*, 39, 1, February, 1998, 33-53.
- * Niederle, Muriel and Alvin E. Roth, “Unraveling reduces the scope of an entry level labor market: Gastroenterology with and without a centralized match,” *Journal of Political Economy*, 1. 111, no. 6, December 2003, 1342- 1352.
- McKinney, C. Nicholas, Muriel Niederle, and Alvin E. Roth, (2003) “The collapse of a medical labor clearinghouse (and why such failures are rare),” *American Economic Review*.
- Niederle, Muriel, and Alvin E. Roth (2004), “The Gastroenterology fellowship match: how it failed, and why it could succeed once again”, *Gastroenterology* 127, August 2004, 658-666.
- Niederle, Muriel, and Alvin E. Roth, “The Gastroenterology Fellowship Market: Should there be a Match?”, *American Economic Review Papers & Proceedings*.

- Frechette, Guillaume, Alvin E. Roth, and Utku Ünver, “Unraveling Yields Inefficient Matchings: Evidence from Post-Season College Football Bowls”, *Rand Journal of Economics*, 38, 4, Winter 2007, 967-982.

7 Oct 17: Matching with wages

- Kelso, Alexander S., Jr. and Vincent P. Crawford (1982), "Job Matching, Coalition Formation, and Gross Substitutes", *Econometrica*, 50, pp 1483- 1504.
- * John William Hatfield and Paul Milgrom, Matching with Contracts, *American Economic Review* 95(4), 2005, 913-935.
- * Ostrovsky, Michael, Stability in Supply Chain Networks, *American Economic Review*, v.98(3), June 2008, pp. 897-923.
- Niederle, Muriel, “Competitive Wages in a Match with Ordered Contracts”, *American Economic Review*, vol. 97, No.5, December 2007, 1957 - 1969.

8 Oct 19: Housing Market

- Ma, J., “Strategy-Proofness and the Strict Core in a Market with Indivisibilities” *International Journal of Game Theory*, 1994, 75-83.
- Herve Moulin (1995), *Cooperative Microeconomics: A Game-Theoretic Introduction*. Princeton University Press, Chapter 3
- Alvin E. Roth and Andrew Postlewaite (1977) “Weak versus strong domination in a market with indivisible goods,” *Journal of Mathematical Economics* 4, 131-137.
- Alvin E. Roth (1982) “Incentive compatibility in a market with indivisibilities” *Economics Letters* 9, 127-132.
- Lloyd Shapley and Herbert Scarf (1974) “On cores and indivisibility,” *Journal of Mathematical Economics* 1, 23-28.
- Lars-Gunnar Svensson (1999) “Strategyproof Allocation of Indivisible Goods,” *Social Choice and Welfare* 16, 557-567.
- *Tayfun Sonmez and Utku Ünver, Matching, Allocation, and Exchange of Discrete Resources, Jess Benhabib, Alberto Bisin, and Matthew Jackson (eds.) *Handbook of Social Economics*, Elsevier, forthcoming.

9 Oct 24: Kidney Exchange

- Hatfield, J. W. (2005), “Pairwise Kidney Exchange: Comment,” *Journal of Economic Theory*.
- *Alvin E. Roth, Tayfun Sönmez and M. Utku Ünver (2003) “Kidney Exchange” *Quarterly Journal of Economics*,
- *Alvin E. Roth, Tayfun Sönmez, and M. Utku Ünver (2005) “Pairwise Kidney Exchange,” *Journal of Economic Theory*.
- Alvin E. Roth, Tayfun Sönmez, and M. Utku Ünver (2005) . A Kidney Exchange Clearinghouse in New England. *American Economic Review Papers and Proceedings*, 95(2): 376-380
- *Alvin E. Roth, Tayfun Sonmez and Utku Ünver (2007), “Efficient Kidney Exchange: Coincidence of Wants in Markets with Compatibility-Based Preferences,” *American Economic Review*, 97(3): 828-851.

10 - 11 Oct 26 & 31 : School Choice

- Abdulkadiroğlu, Atila, Yeon-Koo Che, and Yosuke Yasuda (2008), "Expanding 'Choice' in School Choice," working paper.
- Abdulkadiroğlu, Atila, Parag A. Pathak, Alvin E. Roth, and Tayfun Sönmez (2005), "The Boston Public School Match," *American Economic Review, Papers and Proceedings*, 368- 371.
- Abdulkadiroğlu, Atila, Parag A. Pathak, Alvin E. Roth, and Tayfun Sönmez (2006), "Changing the Boston School Choice Mechanism," working paper.
- * Abdulkadiroğlu, Atila, Parag A. Pathak, and Alvin E. Roth (forthcoming), "Strategy-proofness versus Efficiency in Matching with Indifferences: Redesigning the NYC High School Match," *American Economic Review*.
- Abdulkadiroğlu, Atila, and Tayfun Sönmez (2003), "School Choice: A Mechanism Design Approach," *American Economic Review*, 93: 729-747.
- Chen, Yan, and Tayfun Sönmez, (2006), "School Choice: An Experimental Study," *Journal of Economic Theory*, 127: 2002-231.
- Erdil, Aytok, and Haluk Ergin, (2008), "What's the Matter with Tie-Breaking? Improving Efficiency in School Choice," *American Economic Review*, 98: 669-689.
- Ergin, Haluk and Tayfun Sönmez (2006), "Games of School Choice Under the Boston Mechanism," *Journal of Public Economics*, 90: 215-237.
- Featherstone, Clayton and Muriel Niederle, "Manipulation in School Choice Mechanisms", December 2008.
- Pais, Joana and Ágnes Pintér, (2008), "School Choice and Information: An experimental study on matching mechanisms", *Games and Economic Behavior*, 64, 303-328.
- Pathak, Parag, and Tayfun Sönmez, "Leveling the Playing Field: Sincere and Sophisticated Players in the Boston Mechanism," forthcoming, *American Economic Review*.
- Pathak, Parag, and Tayfun Sönmez, (2008), Comparing Mechanisms by their Vulnerability to Manipulation, working paper, June 2008.

12 Nov 2: School Choice

- *Haluk Ergin (2002) "Efficient Resource Allocation on the Basis of Priorities," *Econometrica*, 70, 2489–2498.
- *Kojima, Fuhito and Mihai Manea, *Axioms for Deferred Acceptance* (2007), forthcoming, *Econometrica*
- Papai, Szilvia, "Strategy-proof Assignments by Hierarchical Exchange," *Econometrica* 68, 1403-1433.
- Kesten, Onur, "On Two Competing Mechanisms for Priority Based Allocation Problems," *Journal of Economic Theory* 127, 2006; 155-171. □

13 Nov 7: Signaling:

- * Coles, Peter, Akexey Kushnir and Muriel Niederle, "Signaling in Matching Markets", working paper, August 2011.
- * Lee, Soohyung, Muriel Niederle, Hye Rim Kim and Ukeum Kim, "Do Roses Speak Louder than Words? Signaling in Internet Dating Markets," 2011.

- Avery, Christopher, Andrew Fairbanks and Richard Zeckhauser, *The Early Admissions Game: Joining the Elite*, Harvard University Press, Cambridge, MA 2003.
- Avery, Christopher and Jonathan Levin, "Early Admissions at Selective Colleges," *American Economic Review*.

14 Nov 9 Decentralized Markets

- Niederle, Muriel and Leeat Yariv, "Matching in Decentralized Markets with Aligned Preferences", November 2008.
- Niederle, Muriel and Leeat Yariv, "Matching Through Decentralized Markets", October 2008.

15, 16 Nov 14 and 16: Random Assignment Mechanisms:

- Abdulkadiroglu, A., and T. Sonmez (2003) "Ordinal Efficiency and Dominated Sets of Assignments," *Journal of Economic Theory*, 112, 157—172.
- Abdulkadiroglu, A., and T. Sonmez (1998): "Random Serial Dictatorship and the Core from Random Endowments in House Allocation Problems," *Econometrica*, 66, 689-698.
- *Bogomolnaia, A., and H. Moulin (2001), "A New Solution to the Random Assignment Problem," *Journal of Economic Theory*, 100, 295-328.
- *Che, Yeon-Koo and Fuhito Kojima, "Asymptotic Equivalence of Random Priority and Probabilistic Serial Mechanisms," forthcoming, *Econometrica*.
- Katta, A.-K. and J. Sethuraman, "A solution to the random assignment problem on the full preference domain" (2006), *Journal of Economic Theory*.
- Kesten, O, "Why Do Popular Mechanisms Lack Efficiency in Random Environments?," forthcoming, *Journal of Economic Theory*.
- *Fuhito Kojima and Mihai Manea, "Incentives in the Probabilistic Serial Mechanism," forthcoming, *Journal of Economic Theory*.
- Fuhito Kojima, "Random Assignment of Multiple Indivisible Objects" (2007), forthcoming, *Mathematical Social Sciences*.
- McLennan A., "Ordinal efficiency and the polyhedral separating hyperplane theorem," *Journal of Economic Theory* 105 (2002), 435-449.
- Yilmaz, O., "House Allocation with Existing Tenants: A New Solution," mimeo
- Manea, Mihai, "Asymptotic Ordinal Inefficiency of Random Serial Dictatorship", *Theoretical Economics*.

17 Nov 28

18 Nov 30

19, 20 Dec 5, 7

Guest lectures

1. Clayton Featherstone
2. Matt Elliott
3. Fuhito?
4. John H?

5. Jacob Leshno or / and Eduardo Azevedo?
6. Eric Budish?