

The Theory and Practice of Matching Markets

Syllabus

Semester: Spring 2014

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Course Objectives: This is a PhD level course on advanced microeconomics. The aim of the course is to give PhD students a background in market design literature in conjunction with the theory of matching, exchange and allocation of discrete resources.

Course Materials:

- Alvin E. Roth and Marilda Sotomayor (1990) Two-Sided Matching: A Study on Game-Theoretic Modelling. Cambridge University Press.
- Tayfun Sönmez and M. Utku Ünver (2011) Matching, Allocation, and Exchange of Discrete Resources, J. Benhabib, A. Bisin, and M. Jackson (eds.), Handbook of Social Economics, Vol. 1A. The Netherlands: North-Holland, 781-852 (a copy of the working paper version is available on my web-site: www2.bc.edu/~unver)
- Articles and working papers listed below
- Lecture notes in class

Course Prerequisites: A “basic” understanding of micro theory and game theory

Grading Requirements: Students who take this course for grade should either (1) write and present a critical review of one of the papers that will be assigned or more preferably (2) start a research paper on matching theory or market design and present initial findings. Presentations are plane for the week of April 15th.

Tentative Course Outline and Tentative Reading List

1. Market Design vs Mechanism Design, Economics Engineering

Alvin E. Roth (2002) The Economist as Engineer: Game Theory, Experimentation, and Computation as Tools for Design Economics. *Econometrica* 70, 1341-1378.
2. Two-sided matching model and stable matching theory (Hospital-intern market, entry-level labor markets for young professionals, school choice)
 - (a) *One-to-one model and many-to-one model*
 - i. David Gale and Lloyd Shapley (1962), “College Admissions and the Stability of Marriage,” *American Mathematical Monthly*, 69, 9-15.
 - ii. Roth and Sotomayor (1990)
 - (b) *Towards a larger class of algorithms and design of the NRMP algorithm*
 - i. Alvin E. Roth, and John H. Vande Vate (1990) “Random Paths to Stability in Two-Sided Matching”, *Econometrica*, 58 No. 6, pp. 1475-1480, 1990.
 - ii. Couples (from Roth and Sotomayor 1990, Chapter 5)
 - iii. 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
 - (c) *Matching with more complicated preferences and auctions*
 - i. Alexander S. Kelso, Jr. and Vincent P. Crawford (1982), “Job Matching, Coalition Formation, and Gross Substitutes”, *Econometrica*, 50, pp 1483-1504.
 - ii. Donald M. Topkis (1998) Supermodularity and Complementarity. Princeton University Press. Chapter 2: Lattices, Supermodular Functions and Related Topics, Pages 7-92.
 - iii. John William Hatfield and Paul Milgrom, (2005) “Matching with Contracts” *American Economic Review* 95 (4), September.
 - iv. Tayfun Sönmez and Tobias Switzer (2013) Matching with (Branch-of-Choice) Contracts at the United States Military Academy. *Econometrica*, 81(2): 451-488, March,
 - v. Tayfun Sönmez (2013) Bidding for Army Career Specialties: Improving the ROTC Branching Mechanism. *Journal of Political Economy*, 121(1): 186-219, February
3. “Housing market” and “House allocation problem” (Dormitory room allocation, school choice, and kidney exchange)
 - (a) *Discrete resource allocation based on priorities and two-sided matching theory: (School choice revisited, school admissions)*

- i. Michel Balinski and Tayfun Sönmez (1999) “A Tale of Two Mechanisms: Student Placement” *Journal of Economic Theory* 84: 73-94, January 1999.
- ii. Atila Abdulkadiroğlu and Tayfun Sönmez (2003), “School Choice: A Mechanism Design Approach.” *American Economic Review*, 93: 729-747.
- iii. Haluk Ergin, “Efficient Resource Allocation on the Basis of Priorities” (2002) *Econometrica*, 70: 2489-2497.
- iv. Atila Abdulkadiroğlu, Parak A. Pathak and Alvin E. Roth (2005) “The New York City High School Match.” *American Economic Review, Papers and Proceedings* 95(2), May.
- v. Atila Abdulkadiroğlu, Parak A. Pathak, Alvin E. Roth and Tayfun Sönmez (2005) “The Boston Public School Match.” *American Economic Review, Papers and Proceedings* 95(2), May.
- vi. Yan Chen and Tayfun Sönmez (2004) “School Choice: An Experimental Study.” *Journal of Economic Theory*, forthcoming (available on JET web site and www2.bc.edu/~sonmezt)
- vii. Yan Chen and Tayfun Sönmez (2002) “Improving Efficiency of On-Campus Housing: An Experimental Study.” *American Economic Review*, 92, 1669-1686.

(b) *Housing market*

- i. Lloyd Shapley and Herbert Scarf (1974) “On cores and indivisibility.” *Journal of Mathematical Economics* 1, 23-28.
- ii. *Herve Moulin (1995) *Cooperative Microeconomics: A Game-Theoretic Introduction*. Princeton University Press, Chapter 3
- iii. Alvin E. Roth and Andrew Postlewaite (1977) “Weak versus strong domination in a market with indivisible goods.” *Journal of Mathematical Economics* 4, 131-137.
- iv. Alvin E. Roth (1982) “Incentive compatibility in a market with indivisibilities.” *Economics Letters* 9, 127-132.
- v. Atila Abdulkadiroğlu and Tayfun Sönmez (2003) “School Choice: A Mechanism Design Approach.” *American Economic Review*, 93, 729-747.

(c) *House allocation problem*

- i. Annund Hylland and Richard Zeckhauser (1977) “The efficient allocation of individuals to positions.” *Journal of Political Economy* 87, 293-314.
- ii. Lars-Gunnar Svensson (1994) “Queue allocation of indivisible goods.” *Social Choice and Welfare* 11, 323-330.
- iii. Lars-Gunnar Svensson (1999) “Strategyproof Allocation of Indivisible Goods” *Social Choice and Welfare* 16, 557-567.
- iv. Szilvia Papai, “Strategyproof Assignment by Hierarchical Exchange” (2000), *Econometrica* , 68: 1403-1433.

- v. Marek Pycia and M. Utku Ünver (2011), “Incentive Compatible Allocation and Exchange of Indivisible Resources” working paper
- (d) *When house allocation meets housing markets (Dormitory room allocation, kidney exchange)*
 - i. Atila Abdulkadiroğlu and Tayfun Sönmez (1999) “House Allocation with Existing Tenants.” *Journal of Economic Theory*, 88, 233-260.
 - ii. Alvin E. Roth, Tayfun Sönmez and M. Utku Ünver (2003) “Kidney Exchange” *Quarterly Journal of Economics*, 119, 457-488
- (e) *When two-sided matching meets one-sided matching (Kidney exchange revisited)*
 - i. Anna Bogomolnaia and Herve Moulin (2004) “Random matching under dichotomous preferences.” *Econometrica* 72: 257-279.
 - ii. Alvin E. Roth, Tayfun Sönmez, and M. Utku Ünver (2005) “Pairwise Kidney Exchange” *Journal of Economic Theory*
 - iii. 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
- (f) *Random allocation, efficiency vs incentives*
 - i. Atila Abdulkadiroğlu and Tayfun Sönmez (1998) “Random serial dictatorship and the core from random endowments in house allocation problems.” *Econometrica* 66, 689-701.
 - ii. Anna Bogomolnaia and Herve Moulin (2001) “A new solution to the random assignment problem.” *Journal of Economic Theory* 100, 295-328.
 - iii. Tayfun Sönmez and M. Utku Ünver (2005) “House Allocation with Existing Tenants: An Equivalence” *Games and Economic Behavior* 52, 153-185