



Yeshiva University

M.Q.E.

Market Design

ECON 5115

Spring 2014

Dr. Tadashi Hashimoto

Syllabus

Course Description

This course aims to introduce classical findings and recent developments in the theory of market design. The course basically consists of two parts.

The first half covers auctions. We first go through the classical theory of auctions in a stylized environment. We then depart from the classical framework and observe what kinds of practical and theoretical difficulties arise and how successfully current attempts deal with these difficulties.

The second half covers matching and related issues. We start from the matching problem (a.k.a. the marriage problem) and its solution concept, stable matching. We then extend the concept of stability to many-to-one and many-to-many matching with contracts. After reviewing the applications of stable matching, we compare it with alternative approaches, such as top trading cycles. We discuss applications including medical residency match, school choice, course allocation, and kidney exchange.

In the last few classes, we overview some recent developments in the theory of market design, mostly in the context of matching.

Course Materials

Lecture notes will be distributed on the course website (TBA). This course does not have a required textbook, but the following optional textbook is recommended for the first part:

- i. V. Krishna, *Auction Theory*, Second Edition, Academic Press. 2009.

The following is an excellent textbook for matching, the central theme of the second half:

- ii. A.E. Roth and M.A.O. Sotomayor, *Two-Sided Matching: A Study in Game-Theoretic Modeling and Analysis*, Cambridge University Press. 1992.

However, students should expect that this textbook covers **only the introductory portion of the second half**.

Grading

Students will be evaluated through **four** assignments (10% each) and **two** closed-book exams, a midterm (20%) and a final (40%). Students are encouraged to work together on the assignments. However, student needs to *individually* write their solutions *in their own words*. No late submission is accepted, unless there is a serious (e.g. medical) justification.

Tentative Class Schedule

Classes 1-2. Introduction. Examples of mechanisms. Basics of mechanism design.

Classes 3-8. Theory of auctions with single-unit demands and homogenous goods (**Krishna, Part I**):
Bayesian equilibria of auctions, revenue equivalence, optimal auctions, ironing, Bulow-Roberts' reinterpretation, Bulow-Klemperer's theorem, winner's curse, affiliation, linkage principle, multidimensional signals and impossibility.

Classes 9-13. Multi-unit auctions (**Krishna, Chapter 17**):
drawbacks of the VCG mechanism, Bernheim-Whinston menu auction, competitive equilibrium, Ausubel auction, core-selecting auction, internet advertising auctions.

Class 14. Midterm exam.

Classes 15-20. One-to-one matching problems. The deferred acceptance algorithm, top-trading-cycle algorithm.
Many-to-one and many-to-many matchings with contracts. Course allocation mechanisms.

Class 21-22. Kidney exchange.

Class 23-24. Random assignment: probabilistic serial mechanism, Hylland-Zeckhauser mechanism, Birkhoff-von Neumann theorem and its extension.

Class 25-26. Recent findings on large markets.

Practical Information

Location: TBA (Wilf campus)

Meeting Times: TR 4:30pm-5:45pm

Office Hours: by appointment

Email: tadashi.hashimoto@yu.edu

Disability Notice

Students with disabilities who are enrolled in this course and who will be requesting documented disability-related accommodations are encouraged to make an appointment with the Office of Disability Services, (646) 685-0118, during the first week of class. After approval for accommodations is granted, please contact me as soon as possible to ensure the successful implementation of those accommodations. Please keep in mind that you must obtain a new accommodation letter for each semester that you request accommodations.