



Yeshiva University

M.Q.E

## Market Design

ECON 5115 CRN 86183

Spring 2016

Dr. Tadashi Hashimoto

## Syllabus

### Course description

This course introduces basic results in *market design*, a subfield of microeconomic theory where researchers propose desirable and often practical solutions to allocation problems in reality. Due to such a practical nature of this topic, students should become able to propose appropriate solutions by themselves to various allocation problems.

We first study allocation problems with monetary transfers. To familiarize students with the analysis of incomplete information models, we initially focus on a seller facing a single privately informed buyer. We then turn to the main component of this part: multiple privately informed buyers, or *auctions*. We first study the classical, stylized theory of auctions. 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. As applications, we will discuss Dutch flower auctions, M&A auctions, oil and gas lease auctions, US treasury bill auctions, spectrum auctions, and internet advertising auctions (as in Google and Bing).

The second part of this course covers allocation without money. We start from the matching problem (aka the marriage problem) and its solution concept, stable matching. After reviewing the applications of stable matching, we compare it with alternative approaches, such as top trading cycles. We will discuss applications including medical residency match, school choice, course allocation, and kidney exchange.

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## Class Information

Location: Glueck Center G307  
Meeting Times: TR 3:00 pm-4:15 pm  
Office Hours: by appointment  
Instructor's Office: Belfer Hall 535 (Wilf; main office in this semester)  
710A at 215 Lexington (Beren; secondary)  
Email: [tadashi.hashimoto@yu.edu](mailto:tadashi.hashimoto@yu.edu)

## Grading

Homework	25%
Midterm exam	25%
Final exam	50%
Participation	extra credit

Even though student can get a 100% score solely from these activities, I encourage active participation in the class in order to gain extra credit. Attendance itself is neither mandatory nor graded even as part of class participation.

## Homework

A short problem set will be given **basically every class**. (At least, no homework due or given on the midterm day.) Students may collaborate, but each student must submit his or her own answers. Students should hand in their answers at the beginning of the next class or email them to the instructor by the beginning of the next class. The solutions will be uploaded right after the deadline.

Students may miss a deadline **twice without any excuse**—I know you are all busy—but even in that case students need to submit their answers within a week from the original deadline. Once this privilege is used up, late submissions will not be regularly graded any more without a justifiable reason (see “Policies on Special Arrangements” below).

Homework is graded mostly based on efforts with minimum requirements on accuracy. The grade of A (4 points) will be given to the answers that resemble to the correct answers in more than 75% of the problems. Similarly, B (3 points) for more than 50%, C (2 points) for more than 25%, D (1 point) for more than 1%, and F (0 point) if nothing is written. Late submissions without permission always get the record of L.

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### **Midterm and Final Exams**

Exams are cumulative and closed-book. The midterm is in-class—on **Tuesday, March 15**. The date of the final exam is **TBA**. No makeup exam is offered except in extreme circumstances. To defer taking the final exam, you must follow the standard procedure set by the university.

### **Policies on Special Arrangements**

Any special arrangement needs supporting documentations. Except in the case of emergency, students are responsible to contact the instructor beforehand. Avoidable or non-substantial conflicts with your other classes (e.g., midterms on the same day) will never constitute a good reason. No additional special arrangement is given after the final exam.

**“Students with disabilities who are enrolled in this course and who will be requesting disability-related accommodations should make an appointment with the Office of Disability Services, [akelsen@yu.edu](mailto:akelsen@yu.edu), (646) 592-4280 during the first week of class. Once you have been approved for accommodations, please contact me to ensure the successful implementation of those accommodations.”**

### **Course Materials**

Lecture notes are distributed through ANGEL Learning (<https://yu.elearning.yu.edu/>). This course has no required textbook, but the following optional textbooks are recommended:

- i. V. Krishna, *Auction Theory*, Second Edition, Academic Press. 2009.
- ii. A.E. Roth and M.A.O. Sotomayor, *Two-Sided Matching: A Study in Game-Theoretic Modeling and Analysis*, Cambridge University Press. 1992.

Note that some topics below are not covered by either book.

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**Tentative Course Plan** (some topics will be skipped)

Part A. Allocation problems with monetary transfers

- A.1. Monopoly problems with a privately informed single buyer—revelation principle, envelope-theorem approach, Bulow-Roberts “marginal revenue,” optimal mechanism and the role of commitment
- A.2. Auctions with private values—Bayesian equilibrium, equilibria of standard auctions, revenue equivalence, optimal auctions, “auctions versus negotiations”
- A.3. Auctions with interdependent values—Milgrom-Weber, winner’s curse, ex post incentive compatibility and impossibility
- A.4. Auctions with multi-unit demand—VCG mechanism and its drawbacks, Ausubel auction, spectrum auctions, internet advertising auctions

Part B. Allocation problems without monetary transfers

- B.1. Stable matching—deferred acceptance algorithm, stability, justified envy, one-sided optimality, strategy-proofness
- B.2. Top-trading-cycles mechanism—efficiency, strategy-proofness, kidney exchange
- B.3. Random assignment—random priority, probabilistic serial mechanism, Hylland-Zeckhauser mechanism, Birkhoff-von Neumann theorem and its extension
- B.4. Advanced topics in matching markets