

Matching in Markets

Module 1, 2023-2024

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Class Time: TBA

Class Format: Zoom

Overview. In this class, we discuss both classic and very recent topics in matching theory, as well as their applications to real-life markets: the medical residency match, school allocations, and others. Starting from basic concepts in matching, the course progresses toward the research frontier.

Attendance and participation. I strongly encourage you to turn on your video cameras during Zoom sessions. Also, please do not hesitate to ask any questions you may have!

Evaluation. The final grade for this class is computed as follows:

Home Assignments*	30%
Individual Class Presentation**	20%
Final Exam	50%

* There will be 3+ home assignments.

** Length: approximately 20-25 minutes including questions and answers. The content is either a discussion of an assigned/selected research paper or your own research idea. A joint presentation by up to two students may be allowed, but in that case, the presentation time should be doubled, i.e., around 40-50 minutes. I will distribute a list of papers to choose from in the first half of the course. *This format is preliminary and subject to change.*

Course Materials. There is no required textbook. The seminal textbook *Two-Sided Matching* by Roth and Sotomayor (1990) from Cambridge University Press covers some classical results, but the course will quickly move to recent advances. I will point to the related journal articles and working papers. In case you are further interested in matching theory and market design more generally, *Online and Matching-Based Market Design* by Echenique, Immorlica, and Vazirani (2023) is an excellent new book that discusses many recent topics and open research questions!

The course outline below is tentative and may change depending on student interests and how the class proceeds:

#	Topic
1	Introduction to two-sided markets: stable matchings
2	Properties of stable matchings
3	Aggregate matchings Linear programming and fractional matchings
4	Decentralized foundation of stability Mechanism design
5	Mechanism design (continued)
6	Design of labor markets: National Resident Matching Program Large matching markets
7	Large matching markets (continued)
8	Matching with incomplete information
9	Many-to-one matching markets: substitutability House allocation, school choice
10	Dynamic matching
11	Robustness of stability
12	Presentations***
13	
14	

The following is a long, but not exhaustive, list of topics we may talk about:

- Continuous models of matching markets (related to large matching markets)
- Reassignment (say, of public-school teachers)
- Matching with constraints
- Matching with transfers and salaries
- Generalized matching: contracts, supply chains, trading networks
- Other applications: kidney and liver exchange, blood allocation
- Mistakes in strategically simple environments
- Auditability and transparency of matching mechanisms
- Experiments

The course is flexible—we may adapt and explore topics aligned with your interests.

Academic integrity policy. Cheating, plagiarism, and any other violations of academic ethics at NES are not tolerated.