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## Matching and Market Design: Theory and Applications Preliminary Syllabus, Winter Term 2016/2017

*Matching* plays an important role in many aspects of our economic and social lives: Students need to be assigned places to study, donor organs need to be matched to patients, workers to jobs, and so on.

This course introduces students to matching theory and its applications to the analysis and design of real-life markets. More specifically, students will learn

- about leading theoretical models of matching
- how to apply theoretical models to develop “good” matching mechanisms for real-life matching markets
- how a mixture of theoretical, experimental, and empirical methods can be used to evaluate existing matching mechanisms and, if necessary, design better ones

**Prerequisites:** This course will be self-contained. Knowledge of basic microeconomic theory and game theory is helpful but not required. A familiarity with writing and understanding proofs is recommended.

**Target Audience:** Master students and PhD students

**Aim:** Students who master the topics of this class are equipped to pursue independent research projects/a master thesis in the area of matching theory and market design.

**Lectures and Tutorials:** The course starts **Monday, October 24th 2016**. From then on, the class will meet two times a week.

- Monday, 10:00 - 11:30 in Hörsaal VIIa, Hauptgebäude 1. UG  
(from **October 24, 2016**)
- Thursday, 10:00 - 11:30 in Seminarraum S 57, Philosophikum EG  
(from **October 27, 2016**)

In general, approximately 2/3 of the meetings will be lectures and the remaining third will be tutorials. In tutorials, we will derive solutions to the problem sets together. The last week of classes is reserved for student presentations. **The language of instruction is English.**

**Registration:** There is no need to sign up in advance. Just come to the first class on October 24th.

**Office hour:** There will be a weekly office hour (time and place TBD) that is open to all students who register for this class.

**Grading:** Each student has to

- present one original research article (list of topics provided by me, further suggestions welcome) in class
- submit a term paper (literature review or original research idea)

More information about grading will be given in class.

### Topics:

1. Introduction
2. One-sided matching: Organs and houses  
(**Applications:** Dormitory rooms, Kidney Exchange)
3. Two-sided matching and entry-level labor markets  
(**Applications:** Entry-level labor markets, Tuition Exchange)
4. School Choice and random assignment
5. Matching with contracts  
(**Application:** Distributional constraints)
6. Matching with continuous transfers and multi-object auctions  
(**Application:** Internet ad auctions)
7. Large matching markets
8. Combinatorial assignment  
(**Application:** Course allocation)
9. Optional topics (time permitting)
  - Dynamic matching markets
  - Matching in networks
  - $\vdots$
10. Student presentations

Depending on students' interests and time constraints, the list of topics will be adjusted during the semester.

### Literature:

As general background reading, you may want to consult the following two books:

- Al Roth, Marilda Sotomayor, Two-sided matching (1990), Cambridge university press (Econometric Society Monograph)
- Al Roth (2015), Who gets what - and why: The new economics of Matchmaking and Market Design, Eamon Dolan / Houghton Mifflin Harcourt

We will also cover a number of academic research articles. More detailed literature references will be available on the lecture slides.