

# Subject: Market Design

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## Core sheet

**Subject code:** KOZNXOPKU03

**Subject name (hungarian):** Market Design

**Subject name (english):** Market Design

**Credit value:** 6

**Course leader:** Dr. Biró Péter

**Department of subject:** Department of Operations Research and Actuarial Sciences

## English Version

### Subject datasheet

**Language of datasheet:** English

**Language of subject:** English

**Purpose of subject:** School choice, college admissions, entry-labour markets, auctions, course allocations and organ exchanges are all examples for matching markets, where money does not necessary has a role. The task of a market designer is to set rules and construct allocation mechanisms so that the resulting solution is fair and in some sense optimal with regard to the true preferences of the participants. Grace to the easiness of collecting the preferences of the participants and the computational tools available to obtain the desired solutions, many large scale centralised matching schemes have been established in the past decades across the world. Our course will give insight into the topic of market design motivated by real applications with theoretical background from applied economics, game theory, operations research and computer science.

**Sustainability:** The matching models under preferences and solution mechanisms studied in this course can be useful for finding fair and efficient solutions for social and economic problems, where the resources (such as school seats) are limited.

**Connection:** This course builds upon the knowledge gained in maths and game theory courses, but no requirement is needed to follow the basics of the course. Therefore the course can be taken by anyone without any prerequisite courses.

**Number of lessons:** 24

**Ad Frequency:** Spring

**Pre-study obligations:** no

**Input mode:** 1

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**Type:** Elmélet

**Timetable:** Two 90 mins lectures per week.

## Learning results

Professional Competences - Knowledge: Students will have a good knowledge about mechanism design in matching markets.

They will learn the basic stable matching models, the deferred-acceptable algorithm used for college admissions; the assignment game that is a basic model for job markets and auction design; the allocation of indivisible goods with the basic serial dictatorship and the more advanced probabilistic serial mechanisms; and the stable exchange problem with the Top Trading Cycle algorithm.

They will understand the basic solution concepts, the characteristics of the desired results, and the properties of different matching and exchange mechanisms.

They will have a good knowledge about the applicability of the models studied with several case studies described in details.

Professional Competences - ability: Students will be able to recognize real-life problems that can be modelled by two-sided matching problems with or out without problems, or as exchange problems.

They will learn how to design a matching scheme based on a solution concept and implemented with a matching mechanism

They will be able to calculate desired solutions by executing the matching algorithms learned.

Professional Competences - attitude: Students will acknowledge the applicability of market design techniques for establishing matching, allocation or exchange schemes.

They will be inclined to see and appreciate fairness and optimality concepts in matching markets.

They will gain confidence and willingness to use their knowledge in real-life applications where market or market mechanisms can be (re-)designed.

## Learning activity

Activity: Students will learn about market design theories, solution concepts and the implementation and properties of main matching mechanisms.

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## Evaluation

Learning activity: Students will learn about market design theories, solution concepts and the implementation and properties of main matching mechanisms.

Viewpoints: Every student has to write an essay either by summarising a scientific paper on market design or studying a real application. A list of recommended papers and applications will be provided, but the students can also study other papers or applications of their choice, after discussing it with the lecturer. A short presentation on the findings is also required in the last two weeks. 50 points can be achieved at the Final exam and the other 50 points will be given for the project essay (30) and presentation (20). The total score is converted to a grade according to the scale below.

0 - 39: Fail (1), 40 - 54: Pass (2), 55 - 69: Satisfactory (3), 70 - 84: Good (4), 85 - 100: Excellent (5).

## Mandatory and recommended literatures

Mandatory literature: Electronic lecture notes will be provided.

Recommended literature: A.E. Roth and M.A.O. Sotomayor: Two-sided matching: a study in game-theoretic modelling and analysis, Econometric Society Monographs, Vol. 18 (Cambridge University Press).

Haeringer, G. (2018). Market design: auctions and matching. MIT Press.

## Mandatory literature in library

**A.E. Roth and M.A.O. Sotomayor: Two-sided matching: a study in game-theoretic modelling and analysis, Econometric Society Monographs, Vol. 18 (Cambridge University Press).**

## Hungarian Version

### Subject datasheet

**Language of datasheet:** Hungarian

**Language of subject:** English

**Number of lessons:** 26\*90p

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**Ad Frequency:** őszi félév

**Pre-study obligations:** nincs

**Input mode:** 1

**Type:** választható

**Timetable:** Friday 9:50-11:20 and 11:40-13:10, C102

## Mandatory and recommended literatures

Mandatory literature: Electronic lecture notes will be provided

Recommended literature: A.E. Roth and M.A.O. Sotomayor: Two-sided matching: a study in game-theoretic modelling and analysis, Econometric Society Monographs, Vol. 18 (Cambridge University Press).

## Recommended literature in library

**A.E. Roth and M.A.O. Sotomayor: Two-sided matching: a study in game-theoretic modelling and analysis, Econometric Society Monographs, Vol. 18 (Cambridge University Press).**