

M024	MR,IPM - elective – Year 2	Mathematical Aspects of Electoral Systems	L+P+S 1+0+1	ECTS 3
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Course objectives. Students will be acquainted with some basic mathematical aspects of electoral systems, as for instance evaluation and designing of electoral systems, models of electoral systems, elementary methods of seat allocation and so on.

Course prerequisites. Previous years of mathematics study programme.

Syllabus.

1. Classification of electoral systems. Plurality and proportional electoral systems – fundamental methods of seat allocation. Examples of electoral methods and procedures of social choice. General model of electoral system. Properties of electoral systems (indicators; proportionality, representation).
2. Designing of electoral systems. Some well known electoral paradoxes. Basic properties of electoral methods in the plurality electoral system and in the proportional electoral system. Integer optimization approach to electoral formulas.

Expected learning outcomes.

After completing the course, students are expected to be able to:

- classify given electoral systems according to their basic properties;
- know some methods in plurality electoral systems and proportional electoral systems;
- calculate numerical values which describe some electoral systems in examples from practice;
- use algorithms for some electoral methods for calculating electoral results and for transforming the number of electoral votes to representative seats;
- analyze electoral data in practical situations and interpret their properties by means of numerical indicators.

Teaching methods and student assessment. Basic terms, characteristics and mathematical aspects of electoral systems are introduced in lectures. The second part of classes is dedicated to students' seminar papers in relation to problems of the electoral system. Lectures and seminars are obligatory. Examination consists of a written and an oral part, and it takes place after completion of lectures. Seminar papers influence the final grade.

Can the course be taught in English: Yes.

Basic literature:

1. T. Marošević, Reviewed teaching papers from lectures available on the website of the course.
2. P. G. Cortona et al.: Evaluation and Optimization of Electoral Systems, SIAM, Philadelphia, 1999.

Recommended literature:

1. A. D. Taylor: Mathematics and Politics – Strategy, Voting, Power and Proof, Springer-Verlag, New York, 1995.
2. J. K. Hodge, R. E. Klima: The mathematics of voting and elections: a hands-on approach, AMS, Providence, 2005.