Course title: Combinatorial and Positional Games		
Lecturer(s): Stojaković Z. Miloš, Mašulović M. Dragan		
Status: elective		
ECTS: 7		
Requirements: --		
Learning objectives Introduction of advanced topics in theory of combinatorial and positional games, as well as their application on solving some classical combinatorial problems.		
Learning outcome Upon completion of the course, the student should master the basic concepts of combinatorial games, as well as the positional game theory – basic approaches used to determine the winner and the general properties of some well-studied positional games.		
Syllabus Types of combinatorial games. Strategies, half a move. Periodic games. Well-founded collection of games. Game-tree, total min-max search through the game-tree. Strategy stealing. Probabilistic approach. Operations on games, sum of games, inverse of a game, equivalent games. Nim-like games, Hackenbush, Kayles. Technique of potentials, Solitaire army. Positional games, tic-tac-toe. Generalization to *n* dimensions. Theorem of Hales and Jewett. Pairing strategies. Existence of a proper two-coloring of the board. Strong and weak games. Maker-Breaker games. Tic-tac-toe on an infinite board, generalizations. Bridge-it, Hex. Biased positional games. Erdos and Selfridge Theorem, examples for optimality. Beck's Weak Win Theorem, Avoider-Enforcer and Picker-Chooser games. Games on graphs, clique game, Hamiltonicity game, perfect matching game. Ramsey games. Probabilistic intuition. Algorithmization of Lovasz Local Lemma.		
Recommended literature 1. Jozsef Beck: *Tic-tac-toe Theory*, Cambridge University Press, 2008. 2. Bernhard von Stengel: *Game theory basics,* LSE, 2008.		
Weekly teaching load	Lectures: 2	Student research: 0
Teaching methodology Lectures, with active participation of the students, discussion, etc. A student is supposed to write a seminar paper.		
Grading method (maximal number of points 100) **Colloquia 30 points, oral exam 70 points**		