Study programme(s): Computer Science	
Level: master	
Course title: Combinatorial Algorithms	
Lecturer: Miloš Stojaković	
Status: elective	
ECTS: 6	
Requirements: Introduction to Algorithms, Discrete Structures 1, Discrete Probability and Statistics	

Learning objectives
Students should learn and understand how to use various types of algorithms that deal with discrete data structures and networks.

Learning outcomes
Minimal: At the end of the course, it is expected that a student is familiar with the concept of computer processing of discrete data structures, and particularly graphs and networks.
Desirable: At the end of the course, it is expected that a successful student is able to find a suitable algorithm for a given problem, to modify and adjust a standard algorithm if needed.

Syllabus
Data structures for storing sets, arrays and networks. Generating and enumerating the elements of the partitive set, subsets of fixed size, permutations. Dynamic programming, examples. Algorithms on networks. Network representation. Hardness, some complexity classes and polynomial reductions. Algorithms for finding a Hamiltonian cycle, a vertex cover, an edge cover, a dominating set, or a proper coloring. Steiner trees. Knapsack problem, Bin packing, TSP. Exact algorithms. Randomized algorithms. Approximation algorithms.

Literature
- T.H.Cormen, C.E.Leiserson, R.L.Rivest, C.Stein, *Introduction to Algorithms,* MIT Press, 2009.
- F.V. Fomin, D. Kratsch, *Exact exponential algorithms,* Springer, 2010.
- V.V. Vazirani, *Approximation Algorithms,* Springer, 2003.
- R. Motwani, P. Raghavan, *Randomized Algorithms,* Chapman & Hall/CRC, 1995.

Weekly teaching load

Lectures: 2	Exercises: 2	Practical Exercises: 0	Student research: 0	Other: **0**

Teaching methodology
Blackboard lectures, blackboard exercises.

Grading method (maximal number of points 100)

Pre-exam oblications	points	Final exam	points
Colloquia	**30**	*Oral exam*	**70**