Course title: Aproximation and randomized alghoritms

Course code: 63557

ECTS: 6

Professor: Borut Robič

Master's program

Prerequisite knowledge :

- Discrete mathematics: set theory, basic combinatorics, logic, proof techniques, graph theory
- Algorithms and data structures: basic algorithms on graphs, analysis of algorithms time and space complexity
- Computability: models of computation, proofs of non-decidability of problems

Short course decription:

- Computational complexity of decision and optimization problems
- NP-complete and NP-hard problems
- Heuristic algorithms, quality of suboptimal solutions, (non)existence of a guarantee of quality
- Approximate solving of NP-hard problems
- Approximation algorithms
- Quality of approximate solutions
- The class APX
- Gap technique
- Approximation schemes
- The classes PTAS and FPTAS
- Limits of approximate solving
- The design of approximation algorithms
- Greedy method
- Focusing on subproblems
- Iterative partitioning
- Dynamic programming
- Randomized solving of NP-hard problems
- Las Vegas and Monte Carlo algorithms
- The classes RP, co-RP, ZPP, PP, BPP
- The design of randomized algorithm
- Random sampling
- Establishing abundance of witnesses
- Random reordering
- Hashing
- Load balancing