Course title: Metaheuristic Methods

Teacher: Tatjana Davidović

Course Status: elective

ECTS value: 12

Requirement:

Course Goals and Objectives: Introduction to optimization problems and their role in everyday life. Acquiring knowledge about modern optimization methods, especially about approximate (heuristic) methods of discrete (combinatorial) and continuous optimization. Enabling students to recognize, formulate and solve numerous problems in the field of combinatorial optimization using metaheuristic methods.

Course Outcome: Students will acquire the theoretical knowledge necessary to understand the problems related to discrete optimization and the ability to identify problems to which it is necessary to apply heuristic methods. They will be trained to efficiently implement some metaheuristic methods and choose the right method for a specific problem. Implementation will include sequential and parallel computer systems.

Course Content

Theory

Combinatorial and Continuous Optimization Problems; Exact Optimization Methods; Classical Heuristics (constructive and iterative); Metaheuristics (Simulated Annealing, Tabu Search, Variable Neighborhoos Search, Genetic Algorithms, Ant Colony Optimization, Bee Colony Optimization, Particle Swarm Optimization); Hybrid Metaheuristics, Matheuristics. Examples of applications: Travelling Salesman Problem, Scheduling and Routing Problems, Clustering Problem, Location Problems.

Practice

Recommended Literature:

[1] Talbi, El-Ghazali. Metaheuristics: from design to implementation. Vol. 74. John Wiley & Sons, 2009.

[2] Gendreau, Michel, and Jean-Yves Potvin, eds. Handbook of metaheuristics. New York: Springer, 2010.

[3] Yang, Xin-She. Nature-inspired metaheuristic algorithms. Luniver press, 2010.

[4] Maniezzo, Vittorio, Thomas Stützle, and Stefan Voss. Matheuristics: hybridizing metaheuristics and mathematical programming. New York: Springer, 2009.

Active teaching hours: 5	Theory: 5	Practice:

Applicable Teaching Methods

Lectures, homework, seminar papers, consultations.

Grading Scheme (max. 100 points)

in-class activity (homework) 10 points, seminar papers 30 points, final exam (oral exam) 60 points