Course: **Computational Complexity and Heuristic Programming**

2019/20, Winter Semester

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**Objectives**  
The goal of the course is the students to become acquainted with the analysis of algorithms, computational complexity and techniques for efficient solving of difficult problems, requiring optimization techniques and approximations.

**Students’ obligations:**

- on-time submitted quizzes, obtaining at least 50% of points altogether,
- on-time submitted 5 assignments, obtaining at least 50% of points for each assignment,
- written exam.

**Grading**

**Seminars**  
Seminars are in the form of consultations. Please, prepare questions and bring in problems you encounter during your individual work. Altogether, there are 5 graded seminar assignments. Each assignment has to be submitted on time and graded with at least 50% of points. To pass the exam one also has to get at least 50% of points in the quizzes. There is a zero tolerance policy in case of plagiarism.

**Exam**  
One A4 sheet of paper is allowed during the written examination. At least 50% of points is required to pass the exam. An oral exam is optional and allowed to students passing written exam who try to improve the grade. Any suspect of plagiarism results in obligatory oral exam for everybody involved.

**Final grade**  
The course grade is composed of seminar grade (50%) and written exam (50%).
Syllabus outline
Lecture topics:
1. Analysis of recursive algorithms: recursive tree method, substitution method, solution for divide and conquer approach, Akra-Bazzi method.
3. Randomization of algorithms.
5. Solving linear recurrences.
6. Analysis of multithreaded, parallel and distributed algorithms.
7. Combinatorial optimization, local search, simulated annealing.
8. Linear programming for problem solving.
10. Memetic algorithms, particle swarm optimization.
11. Differential evolution, artificial immune systems.
13. Practical optimization problems.

Readings


Further readings:
R. Sedgewick, P. Flajolet: *An Introduction to the Analysis of Algorithms*. Addison-Wesley, 1995