TIN093/DIT602, Algorithms, 7.5 hec, HT, 2019–2020

Examiner: Peter Damaschke
Course responsible: Peter Damaschke
Course Assistants/supervisors:
Jeremy Pope, Augustin Mista, Yu-Ting Chen, Niklas Åkerblom, Yu Zheng

---

Course content

Time complexity, O-notation.
Greedy algorihtms. Example: interval scheduling.
Dynamic programming. Examples: weighted interval scheduling,
subset sum, knapsack, string editing.
Divide-and-conquer: searching, skyline problem, recurrence equations,
sorting, median finding, counting inversions, fast multiplication.
Complexity theory: reductions, NP-complete problems, SAT and 3SAT.
Graph algorithms: graph traversal, connectivity, 2-coloring, topological
order, shortest and longest paths.
Additional topics, as far as time allows.

Learning outcomes

After the course you should be able to

- describe algorithms in writing, prove that (and explain why) they are correct and fast,

- recognize non-trivial computational problems in real-world applications and formalize them,

- recognize computationally intractable problems,

- apply the main design techniques for efficient algorithms to problems which are similar to the textbook examples but new,

- perform the whole development cycle of algorithms: problem analysis, choosing, modifying and combining suitable techniques and data structures, analysis of correctness and complexity, filling in implementation details, looking for possible improvements, etc.,

- perform simple reductions between problems,

- explain what NP completeness means,

- critically assess algorithmic ideas,

- explain why time efficiency and correctness proofs are crucial.

Course structure

Lectures, exercise sessions, hand-in assignments, written exam.

Examination form

Grading is based on the written exam.
Point limits: 28/38/48 of 60 for 3/4/5 (CTH), 28/48 of 60 for G/VG (GU).

Course literature

Jon Kleinberg, Eva Tardos: Algorithm Design. Pearson/Addison-Wesley

Schedule

Monday 8:00–9:45 lecture, 10:00–11:45 exercises
Wednesday 10:00-11:45 lecture, 13:15–17:00 exercises

Additional information

–