DD2440, Advanced Algorithms, 2014

Topics in the order they are planned to appear. There might be changes if there is a need for re-planning as there are substantial changes compared to last years course.

There might also be re-planning due to discussion with the students during early lectures. Some topic(s) might be added or removed.

1 Lectures that have taken place

None so far.

2 Topics that we plan to cover.

1 Introduction to the course. Formal models of computation.

2 Sorting and searching. Median in linear time. Lower bounds for sorting and median finding. Double hashing.

3 Integer factorization and primality testing. Some elementary number theory, efficient modular arithmetic and GCDs. Pollard-ρ method, maybe elliptic curve factoring and quadratic sieve.

4 Fast Fourier Transform. Efficient arithmetic on large integers, including division (possible a guest lecture on the package GMP).

5 Approximation for NP-hard optimization problems. Linear Programming and special heuristics for Traveling Salesman problem.

6 Max-Cut by semi-definite programming.

7 Parallel algorithms. Some model discussion but algorithms will be done in circuit model. Addition, multiplication and sorting.

8 Computational Geometry. Line-sweep and some example (finding the pair of closest points or all pairs of intersecting line segments).

9 Kolmogorov complexity and data compression.