

A long-exposure photograph of a train tunnel. The train tracks recede into the distance, flanked by blurred lights from the train and tunnel walls, creating a sense of motion and depth.

Combinatorial & Approximation Algorithms
Spring Term 2019

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1. Course Information
2. Course Homepage
3. Course Contents
4. Exercises

- ▶ Instructor: Dr. Alexander Souza
 - ▶ <mailto:alexander@optineon.com>
- ▶ Homepage:
 - ▶ <http://optineon.com/academics.html>
- ▶ Room: BIN 2.A.10
- ▶ Lecture:
 - ▶ Tuesday: 8:15-9:45
 - ▶ Thursday: 8:15-9:45
- ▶ Exercises biweekly as given on homepage
- ▶ ECTS: 6
- ▶ Written exam: 11.6.2019

- ▶ Description
- ▶ Schedule
- ▶ Lecture Notes
- ▶ Exercise Sheets

- ▶ Further Reading
 - ▶ Cormen et al. – Introduction to Algorithms
 - ▶ Korte, Vygen – Combinatorial Optimization
 - ▶ Mitzenmacher, Upfal – Probability and Computing
 - ▶ Vazirani – Approximation Algorithms

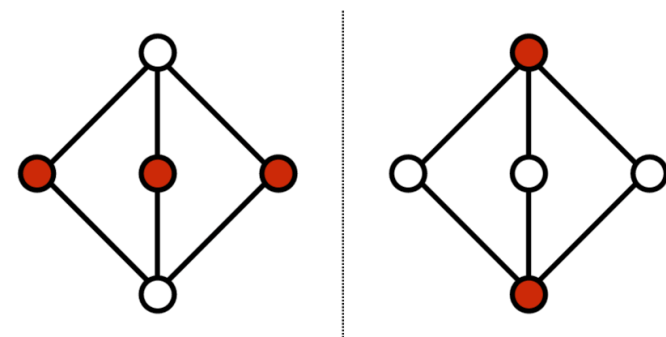
- ▶ Introduction
 - ▶ Combinatorial Optimization
 - ▶ Approximation & Randomized Algorithms

- ▶ Part I – Combinatorial Algorithms
 - ▶ Greedy Algorithms
 - ▶ Network Flows
 - ▶ Matchings
 - ▶ Linear Programming

- ▶ Part II – Approximation Algorithms
 - ▶ Knapsack
 - ▶ Bin Packing
 - ▶ Set Cover
 - ▶ Makespan Scheduling
 - ▶ Satisfiability

- ▶ Dates on course Homepage
- ▶ Start 7.3.2019
- ▶ Sheets out soon
- ▶ Admission to exam
 - ▶ Half of problems being worked on
 - ▶ Sincere attempt
- ▶ Hand in at exercise lesson, return the week after

- ▶ **Vertex Cover:** Given a graph $G = (V, E)$, find a smallest subset C of V , such that each edge of E has at least one end-vertex in C .
- ▶ Classical NP-hard optimization problem
- ▶ **PACE:** Parameterized Algorithms and Computational Experiments
- ▶ Programming challenge 2019
 - ▶ <https://pacechallenge.org/2019/vc/>
- ▶ Throughout the semester, we will demonstrate optimization techniques and tools in this framework
- ▶ Students are highly encouraged to design their own algorithms/experiments





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