INF 334: Advanced Algorithms

August-December 2018

Topics to be covered: Syllabus

This is the syllabus for INF334. The course is based on three different books, mainly from:

- AD = Algorithm Design by Kleinberg / Tardos

But also from

- PA = Parameterized Algorithms
  Marek Cygan, Fedor V. Fomin, Lukasz Kowalik, Daniel Lokshtanov, Daniel Marx, Marcin Pilipczuk, Michal Pilipczuk, Saket Saurabh: Parameterized Algorithms. Springer 2015, ISBN 978-3-319-21274-6, pp. 3-555
- EA = Exact Exponential Time Algorithms
  Fedor V. Fomin, Dieter Kratsch: Exact Exponential Algorithms. Texts in Theoretical Computer Science. An EATCS Series, Springer 2010, ISBN 978-3-642-16532-0, pp. 1-203

Note: The course assumes familiarity with the currucilum of INF334 and INF235 There will also be some results taught directly from some articles. Those articles will be provided during the course.

Parameterized Algorithms: Basic, Branching, Kernelization, Iterative Compression [PA]

Approximation Algorithms: Greedy Algorithm – Load Balancing, Center Selection Problem, Set Cover, The Pricing Method: Vertex Cover, Linear Programming and Rounding: An application to Vertex Cover, Knapsack [Chapter 11, AD]

Randomized Algorithms: Contention Resolution, Global Mincut, Random Variables and Expectations, Max-3-SAT approximation [Chapter 12, AD], Color Coding [PA]

Exact Exponential Time Algorithms: Exact Algorithms for Coloring, SAT, Directed Feedback Arc Set, Max-Cut, Monotone-Loacal-Search [EA]

Graph Classes: Tree-Decompositions, Tree-decompositions and Chordal Graphs, [Chapter 7, PA] Chordal Graphs and Interval Graphs