CS Theory Reading Group
Spring 2016
CSC 801-002/CSC295-002

Led by:
Blair D. Sullivan (blair_sullivan@ncsu.edu)
Felix Reidl (fjreidl@ncsu.edu)

Meetings: Fridays 1:00 - 2:30 PM, EBII 3211 (unless otherwise noted)

Tentative schedule of papers/topics:

week 1: Lipton-Tarjan (w/ introduction of PTAS)
R. Lipton, R. Tarjan: A Separator Theorem for Planar Graphs
http://epubs.siam.org/doi/pdf/10.1137/0136016
http://www.cs.princeton.edu/courses/archive/fall06/cos528/handouts/sepplanar.pdf

week 2: Baker's technique
B. Baker, Approximation algorithms for NP-complete problems on planar graphs.
prox.lib.ncsu.edu/http://dl.acm.org/citation.cfm?id=174650

week 3: Max-flow Min-cut
cover the push-relabel (aka preflow-push) algorithm - not Ford-Fulkerson!
A. Goldberg, R. Tarjan: A new approach to the maximum-flow problem
http://dl.acm.org/citation.cfm?id=61051

week 4: LP duality
formulate max-flow min-cut as LP; cover weak and strong duality, e.g. as covered in
http://www.pitt.edu/~kaveh/Lin-programming-notes.pdf

week 5: Vertex Cover approximation - 3 ways (greedy, rounding, duality)
e.g. as covered in these lecture notes:
https://www.cs.umd.edu/class/spring2011/cmsc651/vc.pdf

week 6: Color-coding (w/ intro to FPT)
N. Alon, R. Yuster, U. Zwick: Color-coding: a new method for finding simple paths, cycles
and other small subgraphs within large graphs.
http://www.tau.ac.il/~nogaa/PDFS/colpr.pdf

week 7: Treewidth & dynamic programming (via Dominating Set)
J. Albert, R. Niedermeier: Improved Tree Decomposition Based Algorithms for Domination-like
Problems
http://prox.lib.ncsu.edu/http://link.springer.com/chapter/10.1007%2F3-540-45995-2_52

week 8: Intro to Matroids
D. Neel, N. Neudauer: Matroids You Have Known
http://www.maa.org/sites/default/files/pdf/shortcourse/2011/matroidsknown.pdf
More information in Oxley's paper:
https://www.math.lsu.edu/~oxley/survey4.pdf

week 9: Fast subset convolution
A. Björklund, T. Husfeldt, P. Kaski, M. Koivisto: Fourier Meets Möbius: Fast Subset
Convolution.
http://web.stanford.edu/~rrwill/presentations/subset-conv.pdf

week 10: TSP on cubic graphs
D. Eppstein: The Traveling Salesman Problem for Cubic Graphs
http://jgaa.info/accepted/2007/Eppstein2007.11.1.pdf

week 11: Introduction to the polynomial hierarchy
Please cover NP, co-NP, Σ_i^p, Π_i^p, alternating Turing Machines, and quantified
Boolean formulas.
Also give proof of collapse of hierarchy if NP = co-NP. (no canonical reference; use the web
wisely).

week 12: Cuckoo hashing
R. Pagh; F. F. Rodler: Cuckoo Hashing
http://www.it-c.dk/people/pagh/papers/cuckoo-jour.pdf