CS602

Applied Algorithms

Convex Programming in Combinatorial Optimization

Instructor: Rohit Gurjar
TAs: Rohit Kumar Singh, Amit Jaiswal

https://www.cse.iitb.ac.in/~rgurjar/CS602_2021/CS602.html
Course Contents

• Pre-requisites:
  • CS218/CS601 (not a hard pre-req)
  • Linear Algebra (Vector Space, Basis, Null space, Matrix Rank)
  • Graph Theory

• Course Contents:
  • Linear Programming Basics, Duality, Primal Dual Approach.
  • LP in Combinatorial Optimization: Matching, Flow, Shortest Path,
  • Semidefinite Programming (SDP), Convex Programming, Duality, Algorithms
  • Approximation Algorithms: Steiner Tree, Max SAT, Max Cut
  • Online Algorithms: Matching, Load Balancing
  • Continuous Methods for Flow/matching. Submodular Functions
How will we do it

• Live lectures on Webex + Recordings on Moodle

• Mon 10:35 Tue 11:35 Thu 8:35

• Take home assignments. Will try to give regular short Moodle quizzes.

• Possibly have student presentations.

• Weightage: Moodle quizzes (10%), End-sem (40%), Assignments+Presentations (30+20).
References

- Last year’s course [website](#) on my homepage.


- David B. Shmoys and David P. Williamson, *The Design of Approximation Algorithms*.


- Niv Buchbinder and Joseph Naor, *The design of competitive online algorithms via a primal-dual approach*.

- Nisheeth K. Vishnoi. *Algorithms for Convex Optimization*