Combinatorial Optimization Algorithms

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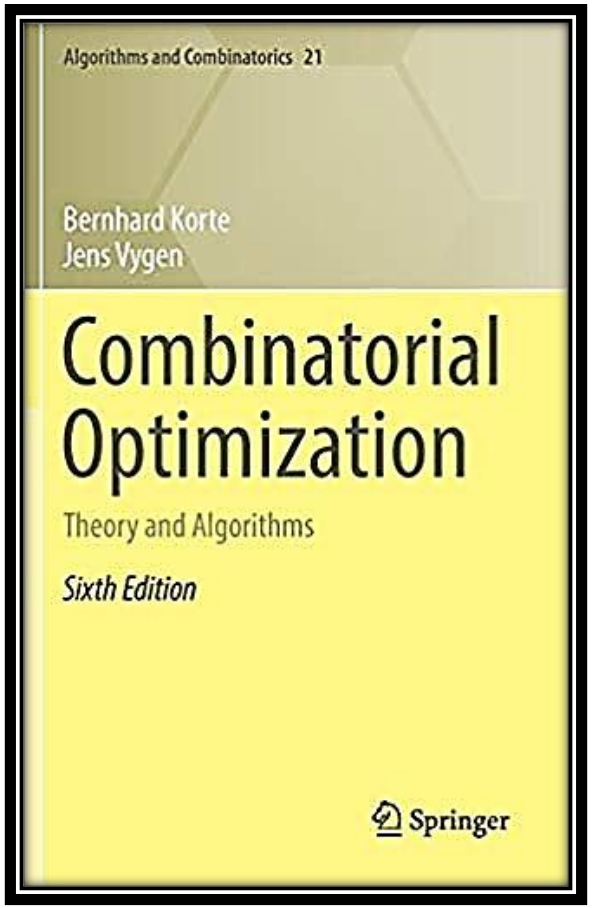
Spring 2019

Prerequisites

- Design and Analysis of Algorithms

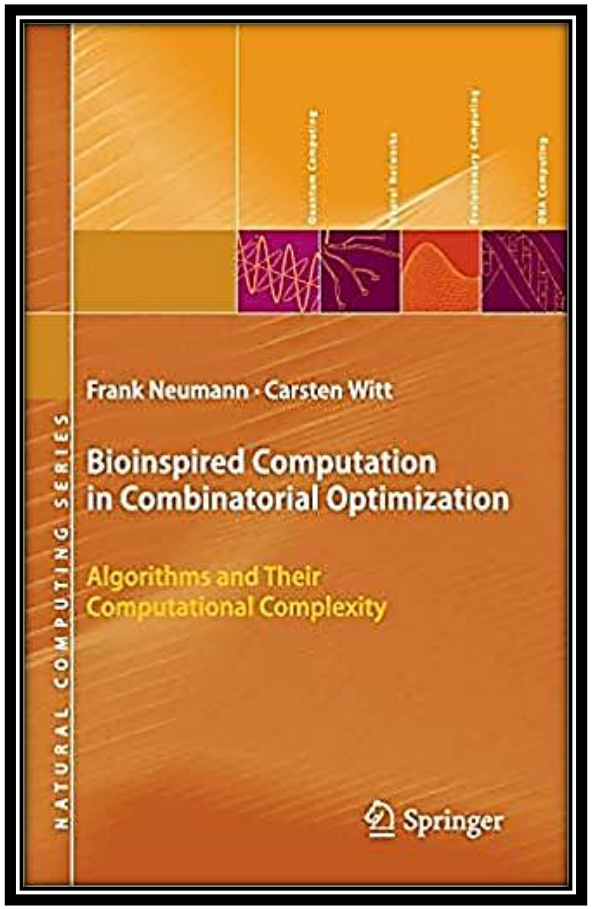
References (Main)

- Combinatorial Optimization: Theory and Algorithms (Algorithms and Combinatorics) 6th ed., by Bernhard **Korte** and Jens **Vygen**, Springer, (2018)



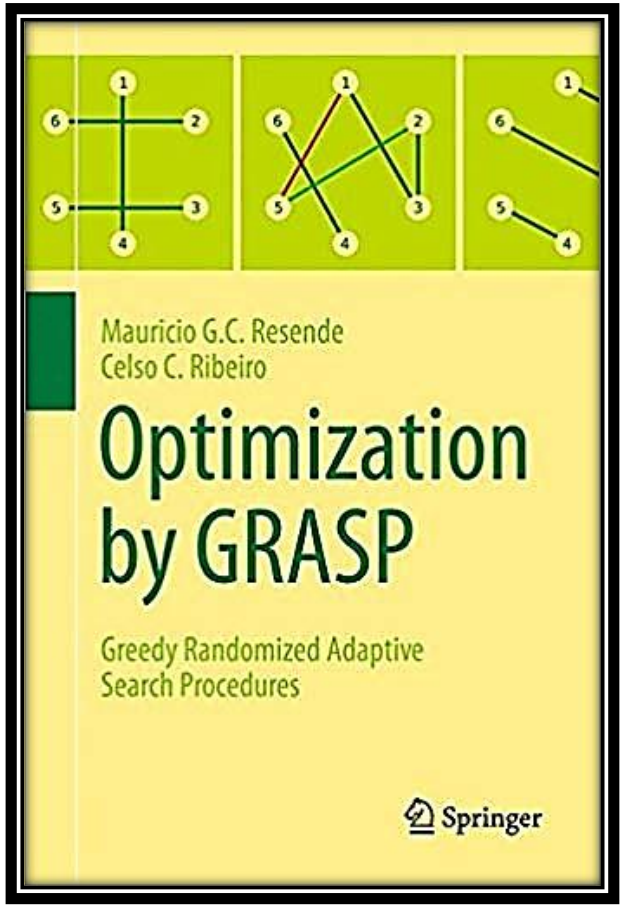
References

- Bioinspired Computation in Combinatorial Optimization: Algorithms and Their Computational Complexity (Natural Computing Series), by Frank **Neumann** and Carsten **Witt**, Springer, (2010)



References

- Optimization by GRASP: Greedy Randomized Adaptive Search Procedures, by Mauricio G.C. **Resende**, Celso C. **Ribeiro**, Springer, (2016)



References

- Combinatorial Optimization: Exact and Approximate Algorithms, by Luca **Trevisan,** Stanford University, (2011)

- Other Related Lectures and Research Papers

Syllabus

- Introduction to Combinatorial Optimization
- Linear Programming (LP), Integer Linear Programming (ILP), Mixed Integer Linear Programming (MILP)
- Linear Programming Duality
- Linear Programming Relaxation (Rounding)
- Simplex Method
- Maximum Flow
- Minimum Cost Flow
- Multicommodity Flows
- Job Assignment Problem
- Resource Allocation in Distributed Systems via Convex Programming
- Matchings
- Facility Location
- Heuristic and Metaheuristic Algorithms for Combinatorial Optimization Problems
- Solvers and Tools (e.g., IBM CPLEX Solver)

Evaluation

Participation in Class Activities	+5%
Assignments	10%
Research, Presentation and Report	25%
Implementation and Documentation	**40%**
Final Exam	25%

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