Notice
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The syllabus may, and probably will, change for future offerings. Be sure that you are studying from the right syllabus, not from an obsolete one.

Major Texts


Supporting Texts


Major Topics

1. Mathematical prerequisites
   - evaluation of sums
   - solution of recurrence relations
   - generating functions
   - elements of probability
   - number theory
   - complex numbers
   - calculus
   - linear algebra

   CLR, Ch 4, Appendices A-C
   SWK, Part 1
   GT, Ch 1
   KN, Vol 1: Ch 1, Ch 2, Vol 2: Ch 4
   GKP

2. Models of Computation
   - RAM
   - PRAM

   CLR, Ch 1, Ch 2
   GT, Ch 1, Ch 14

3. Strategies
   - divide and conquer
   - matroids
   - greedy method
   - dynamic programming
   - DFS/backtracking
   - approximation algorithms
   - randomized algorithms
   - parallel and distributed algorithms

   CLR, Ch 2, Ch 5, Ch 8, Ch 15, Ch 16, Ch 22, Ch 27, Ch 35
   GT, Ch 5, Ch 11, Ch 13, Ch 14
   AKL
   HB

4. Analysis Techniques
   - asymptotic analysis
   - probabilistic analysis
   - amortized analysis
5. Data Structure topics
   - elementary structures: lists, stacks, queues
   - heaps
   - hashing
   - trees, BSTs, red-black trees, B-trees
   - disjoint sets

6. Sorting
   - lower bound on comparison-based sorting
   - QuickSort, HeapSort, MergeSort, InsertionSort
   - median finding
   - searching
   - selection
   - sorting in linear time

7. Graphs
   - representations
   - DFS, BFS
   - MSTs
   - topological sorting
   - connected components
   - shortest paths
   - flows
SWK, Part 5

8. Polynomials
   CLR, Ch 30
   GG, Ch 6
   KN, Vol 2: Ch 4

9. Matrix Arithmetic
   CLR, Ch 28
   GG, Ch 6

10. NP-Completeness
    CLR, Ch 34
    GT, Ch 13
    GJ

11. Linear Programming
    CLR, Ch 29

12. Number-Theoretic Algorithms
    CLR, Ch 31
    GT, Ch 10
    KN, Vol 2: Ch 4

13. String Matching
    CLR, Ch 32
    GT, Ch 9

14. Computational Geometry
    CLR, Ch 33
    GT, Ch 12
    ORK, Ch 3, Ch 7