

Course Syllabus  
CS 6363 – Computer Algorithms  
Textbook: Introduction to Algorithms, Second Edition  
Cormen, Leiserson, Rivest, and Stein

The course is primarily about the efficient design of algorithms. The course is structured around three major techniques for algorithms design: (1) divide-and-conquer, (2) dynamic programming, and (3) the greedy method. In addition, it includes topics on the Max Flow/Min Cut algorithm, (presumably) intractable problems, NP-completeness, and polynomial time approximation algorithms. Problems from various sources are used to illustrate algorithm design techniques and NP-completeness. The course also emphasizes methods to analyze an algorithm's running time and prove its correctness.

I. Divide-and-Conquer

- The “Master Theorem” (Chapter 4)
- Finding the closest pair of points in the plane
- $O(n \log n)$  element switching network and small depth and size sorting networks
- Fast methods for multiplying large integers
- Linear time median algorithm and other examples

II. Dynamic Programming

- Chapter 15.
- All pairs shortest paths (Chapter 25)
- 0/1 Knapsack problem, and other examples

III. Greedy Method

- Huffman codes (Chapter 16)
- Disjoint Set Data Structures (Chapter 21)
- Spanning Tree algorithms (Chapter 23)
- Shortest Paths (Chapter 24); other examples

IV. Additional Topics

- Chapter 26. Max Flow/ Min Cut algorithms
- Chapter 34. NP-Completeness
- Chapter 35. Approximation Algorithms

Grading:

- Quizzes 20% (announced and unannounced),
- 2 Midterms: 40% (Thursday, Sept. 21 and Thursday, Oct. 26)
- Final Exam: 30% (2:00 p.m. Thursday, November 30)
- Homework 10%

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