CSE 521: Design and Analysis of Algorithms I
Spring 1997
Course and Text Outline

Cormen, Leiserson, and Rivest's *Introduction to Algorithms* is 1000 pages long, and full of interesting material. In order to cover some of the more advanced topics, and avoid overlap with undergraduate material many of you will have seen already, I have divided up the responsibility of covering all the material.

The first set of chapters listed below will be your responsibility to read on your own. This is fundamental background material, and if you don't know it, much of what we cover in class won't make sense. Even if you've learned all this before, it is worth skimming as a refresher, and also to adapt to any idiosyncracies in the text.

The second set of chapters is (a superset of) material that I hope to cover in class. You should read along with me, and be sure you've read the background chapters in the first set as needed. The order given below is the order in which I plan to cover the material.

1. Chapters to read on your own

A. Foundations: read before other chapters

1. Introduction
2. Growth of functions
3. Summations
4. Recurrences (Sections 4.1-4.3)
5. Sets, relations, functions, graphs, and trees

B. Sorting

7. Heapsort: read before Chapters 20, 21, and 26
8. Quicksort
9. Linear time sorting

C. Data structures

11. Elementary data structures
12. Hash tables
13. Binary search trees (Sections 13.1-13.3): read before Chapters 14 and 15
22. Union-find on disjoint sets (Sections 22.1-22.3)

D. Graph algorithms

23. Elementary graph algorithms (Sections 23.1-23.4)
24. Minimum spanning trees: read after Chapter 17
25. Single-source shortest paths (Sections 25.1-25.2): read after Chapter 17

D. NP-completeness

36. NP-completeness: read before Chapter 37

2. Chapters to be covered in lecture

A. Divide and conquer

31. Matrix operations
32. Polynomial operations and the fast Fourier transform

B. Dynamic programming

16. Dynamic programming
26. All pairs shortest paths

C. Greedy method

17. Greedy algorithms

D. Data structures

14. Red-black trees
15. Augmenting red-black trees
20. Binomial heaps
21. Fibonacci heaps

E. Advanced topics

27. Maximum flow
33. Number-theoretic algorithms
34. String matching
35. Geometric algorithms
37. Approximation algorithms for NP-complete problems