CS 3510: Design and analysis of algorithms
Fall 2008

General Description: Efficient algorithms for fundamental computational problems. NP-Completeness.

Prerequisites: A course in constructing proofs (equivalent to cs1050), introduction to programming (equivalent to cs1312), background in elementary data structures, and a discrete mathematics course such as Math 3012 or permission of the instructor.

Instructor: H. Venkateswaran, Klaus 2136, (404) 894-3658, venkat@cc.gatech.edu, Office Hours: MW 2pm - 3pm and by appointment.

Teaching Assistant: Shiva Kintali, kintali@gmail.com, office hours: Thu: 4:00 - 6:00pm.

Grader: Sushma Rao, sushma.rao@gatech.edu.

Text book: Title: Algorithms

Authors: Sanjoy Dasgupta, Christos Papadimitriou, and Umesh Vazirani

Grading: up to 5 homework assignments 25%, up to 5 Tests 40%, and a final examination 35%. The test with the lowest grade will be dropped.

Guidelines: Do not share answers. Please write your own solutions. If you work with others, please list their names. For solutions obtained verbatim from the Internet or other sources, no credit will be given. No late homeworks. Give short but complete and precise answers.

All announcement such as the dates for the tests will be made in the class. It is your responsibility to keep up with the happenings in the class.

Syllabus:

1. Introduction. (Chapter 0)
2. Divide and Conquer: merge sort, divide and conquer recurrences, Strassen's matrix multiplication, median-finding. (Chapter 2)
3. Elementary graph algorithms: graph traversals and applications. (Chapters 3, 4).
4. Greedy algorithms: minimum spanning trees, shortest paths, and Huffman codes. (Chapter 5).
5. Dynamic programming: matrix-chain multiplication, longest common subsequences, Warshall's algorithm for transitive closure. (Chapter 6).
6. Maximum-flow, Ford-Fulkerson algorithm, max-flow min-cut theorem, maximum matching in bipartite graphs. (Notes).
7. NP-Completeness: Basic notions such as reducibility and completeness. Examples of NP-Complete problems. (Chapter 8).
8. Simple approximation algorithms. (Section 9.2).
9. Other topics as time permits.