CS 5114: Theory of Algorithms
Fall 2005

Instructor: Vicky Choi

- Office: McBryde Hall 512
- Office Hours: Monday and Tuesday 3:45pm - 5:15pm
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Teaching Assistant: Donghang Guo

- Office : McBryde Hall 133
- Office Hours: Tuesday 1:00pm - 3:00pm, Thursday 1:00pm - 2:00pm
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Class Information:

- CRN : 95415
- Class Time: 2:30pm - 3:45pm Mondays and Wednesdays, meets at MCB 240
- Course Web Site: http://www.cs.vt.edu/~vchoi/5114/

Prerequisites:

- CS 2604: Data Structures and File Management

Course Overview: This course presents the fundamental techniques for designing efficient computer algorithms, proving their correctness, and analyzing their running times. General topics include review of asymptotics, mathematical analysis of algorithms (summations and recurrences), algorithm design techniques (such as divide-and-conquer; dynamic programming, and greedy algorithms), graph algorithms (minimum spanning trees and shortest paths), NP-completeness and approximation alagorithms.

Textbook: (Required) **Algorithm Design.** Jon Kleinberg and Eva Tardos. Addison Wesley, 2005.

References:

- T. Cormen, C. Leiserson, R. Rivest, C. Stein. **Introduction to Algorithms**, Second Edition, McGraw Hill and MIT Press, 2001.
- Michael R. Garey and David S. Johnson. **Computers and intractability : a guide to the theory of NP-completeness.** W. H. Freeman, 1979.

Tentative Syllabus(subject to change):

- Introduction: Stable matching problem. Chapter 1 (1 lecture)
- Basics of Algorithm Analysis. Chapter 2 (2 lectures)
- Graphs. Chapter 3 (3 lectures)
- Greedy Algorithms. Chapter 4 (3 lectures)
- Divide and Conquer. Chapter 5 (3 lectures)
- Dynamic Programming. Chapter 6 (3 lectures)
- Network Flow. Chapter 7 (2 lectures)
- NP and Computational Intractability. Chapter 8 (5 lectures)
- PSPACE & Extending the Limits of Tractability. Chapter 9 & 10 (2 lectures)
- Approximation Algorithms. Chapter 10 (2 lectures)

Course Work and Grading: Course work will consist of homework assignments, a midterm exam and a comprehensive final exam. Tentatively midterm will be on Oct 5, 2005 2:30pm - 3:45pm and final exam on Dec 12, 2005 3:25pm - 5:25pm.

The weights distribution:

- Homework assignments: 25%
- Midterm : 30%
- Final : 45%

Homeworks are to be turned in at the beginning of the class on the due date. **No late homeworks will be accepted.** In exceptional circumstances (illness, university business, or religious observances) extensions may be granted. However, all extensions must be approved by the instructor before the due date. Homework should be written neatly (otherwise you might be required to prepare your solutions electronically, using LaTeX or other word processors).

Honor Code. For homework problems, discussion among students is permitted, but students MUST write up solutions independently on their own. The Virginia Tech Honor Code will be strictly enforced in this course. All aspects of your work will be covered by the Honor System.

Note: Students who require accommodations due to disability should notify the instructor during the first week of classes.