Syllabus for *Theory of Algorithms*
CS 5114, Spring 2009

Meeting Times	12:30pm–1:45pm, Tuesdays and Thursdays, McBryde 329
Instructor	T. M. Murali, 231-8534, Torgerson 2160B murali AT cs DOT vt DOT edu http://bioinformatics.cs.vt.edu/~murali **Please include "CS 5114" in the subject of all email messages.**
Office Hours	3pm–5pm Mondays and by appointment
Teaching Assistant	Ajeet Singh, ajeets AT vt DOT edu
Office Hours	10am–12pm, Wednesdays and Fridays, 106 McBryde
Listserv	CS5114_11910@listserv.vt.edu
Course Web Page	http://courses.cs.vt.edu/~cs5114/spring2009

Course Description

CS 5114 is a traditional introduction to the theory of algorithms for computer science graduate students. It covers methods to construct algorithms and to analyze algorithms mathematically for correctness and efficiency (e.g., running time and space used). The course starts with definitions of algorithmic efficiency, discusses powerful paradigms for algorithm design, defines the theory of NP-completeness, and presents current approaches for coping with intractability, including approximation and randomized algorithms. The course provides a foundation for research in the design and analysis of algorithms itself or on problems with significant algorithmic content.

If you are unable to attend scheduled office hours and need to meet with us, please send us email to set up an alternative time. If you need any accommodations because of a disability, if you have emergency medical information to share with the instructor, or if you need special arrangements in case the building must be evacuated, please meet the instructor as soon as possible.

Pre-requisite

CS 2604, Data Structures and File Management. An undergraduate course in algorithms is not required, but will be very helpful.

Textbook and References

The required textbook is "Algorithm Design" by Jon Kleinberg and Éva Tardos, published by Addison-Wesley in 2006. The ISBN for the textbook is 0-321-29535-8.

Grading

There will be approximately 10 homeworks, a midterm examination, and a comprehensive final examination. Both examinations will be take-home, although this option may change. Homeworks account for 60%, the midterm examination for 15%, and the final examination for 25% of the grade.

A typical homework assignment consists of two or three problems, posted on the course web site approximately one week before the due date and announced on the class listserv. You must submit hard copies of your solutions to each homework at the beginning of the class is it due on. I strongly suggest that you use LaTeXto format your homeworks.
Homework and examination problems are often tricky and difficult. Many of them will not involve straightforward applications of concepts taught in class but will require you to apply these concepts in creative ways. For most of the homework problems, there is more than one correct solution. Therefore, solution sketches posted by the instructor cannot cover all possible answers.
The instructor designs all the homeworks and the exams (midterm and final). The instructor grades both the exams. The TA grades the homeworks. If you feel that an exam, homework, or project has been graded incorrectly, you may request that it be regraded. You must make requests for regrades to the instructor within one week of the date you received the graded assignment back.

Syllabus

Below is an approximate schedule for the course. **This schedule is subject to change. Please consult the course website for the most up-to-date schedule.** The schedule on the course website will list required reading for each class. Lectures will cover the reading material as comprehensively as possible. **Students are expected to supplement lectures with a careful study of the relevant sections of the textbook.**

- Introduction. Chapter 1
- Basics of Algorithm Analysis. Chapter 2
- Graphs. Chapter 3
- Greedy Algorithms. Chapter 4
- Divide and Conquer. Chapter 5
- Dynamic Programming. Chapter 6
- Network Flow. Chapter 7
- NP and Computational Intractability. Chapter 8
- Approximation Algorithms. Chapter 11
- Randomised Algorithms. Chapter 13

Honour Code

The honour code is in effect for every aspect of this class. You are expected to do your own work. No one may give you answers to homeworks or exams. The instructor and the TA are available to provide any assistance that you may need. You may not exchange any solutions, either in pieces or in entirety, by any electronic means or hard copy.