Syllabus: CS 4104
Data and Algorithm Analysis
Fall, 2006

1 General Course Information

CRN	91683
Meeting Time	8:00 AM–9:15 AM; Tuesdays and Thursdays
Classroom	McBryde 233
Final Exam	Wednesday, December 13, 4:25–6:25

Instructor: Lenwood S. Heath

- **Office:** 2160J Torgersen Hall
- **Office Hours:** 9:30–10:30 Tuesdays and Thursdays; 11:00–noon Wednesdays
- **Email:** `heath@vt.edu`

Teaching Assistant: Liguang Xie

- **Office Hours Held in:** 133A McBryde Hall
- **Office Hours:** 2:00–5:30 Mondays and Wednesdays
- **Email:** `windgoon@vt.edu`

Web Site: `http://courses.cs.vt.edu/cs4104/heath/Fall2006/index.php`

Blackboard (Course Grades Only): `https://learn.vt.edu/`

Class Listserv: `CS4104_91683@listserv.vt.edu@listserv.vt.edu`

Prerequisites:

- CS 2604, Data Structures and File Management
- MATH 3134, Applied Combinatorics and Graph Theory, or MATH 3034, Introduction to Proofs

Required Textbook: Introduction to Algorithms (Second Edition). Cormen, Leiserson, Rivest, and Stein. MIT Press, 2001. ISBN: 0-07-013151-1.

2 Course Description

This course emphasizes techniques for constructing efficient algorithms and techniques for analyzing the efficiency of an algorithm. The notion of a *problem* is defined. Problems in a number of application areas are covered. Lower bounds on the efficiency of solving a problem are also addressed, especially the notion of NP-completeness.

3 Grading Policy

Grading for the course is on a 1000-point scale, with the points distributed as follows:

Homework assignments: 10 at about 60 points each	600
Midterm exam: October 19, 2006	150
Final exam: Wednesday, December 13, 4:25–6:25	250

A typical homework assignment consists of 2 to 4 problems, posted on the course web site approximately one week before the due date.

All homework must be prepared with LaTeX[1] or other word processing system and submitted as a stapled printout, in class, on the due date[2]. **No late homework will be accepted.**

4 Readings

For most classes, there is a reading assignment (see Section 7) to be completed by class time. Each assignment consists of sections in the textbook.

5 Ethics

The Honor Code applies. All work submitted must be the student's own work. Students may solicit help only from the instructor or the GTA.

6 Announcement

If any student needs special accommodations because of a disability, please contact the instructor during the first week of classes.

[1] See LaTeX resources on the course web site.

[2] See Calendar on the course web site.

7 Course Schedule

Dates	Reading Assignment	Topics
August		
8/21–8/25	Chapters 1 and 2	Problems, complexity, analysis
8/28–9/1	Chapter 3; Section 15.1	Asymptotics; dynamic programming
September		
9/4–9/8	Sections 15.2–15.4	Dynamic programming
9/11–9/15	Sections 16.1–16.3	Greedy algorithms
9/18–9/22	Section 23.1–23.2	Substitution arguments; minimum spanning trees
9/25–9/29	Section 22.2–22.4	Depth-first search; topological sort
October		
10/2–10/6	Sections 24.1–24.3	Single-source shortest paths; relaxation; Bellman-Ford; Dijkstra
10/9	Fall Break	
10/10-13	Sections 25.1–25.2	All-pairs shortest paths; Floyd-Warshall; transitive closure
10/19	**Midterm Exam**	Topics through single-source shortest paths
10/16–10/20	Sections 34.1–34.2	Polynomial time; optimization and decision problems; encoding problems
10/23–10/27	Sections 34.2–34.3	Polynomial-time reductions and NP-completeness
November		
10/31–11/3	Sections 34.4–34.5	Proving problems NP-complete
11/6–11/10	Sections 32.1–32.3	String matching
11/13–11/17	Sections 35.1–35.3	Approximation algorithms
11/20–11/24	Thanksgiving Break	
11/27–12/1	Sections 28.1–28.3	Matrix operations; Strassen's algorithm; LUP decomposition
December		
12/5	**Last Day of Class**	Review for final; questions on homework solutions and course material
12/13	**Final Exam**	**4:25–6:25:** Comprehensive final exam

End of Syllabus