

Syllabus: CS 4104
Data and Algorithm Analysis
Spring, 2004

Instructor: Lenwood Heath

- **Office:** 2160J Torgersen Hall
- **Office Hours:** 3:00–5:00 Wednesdays; 11:00–noon Thursdays
- **Email:** heath@vt.edu

Graduate Teaching Assistant: Jonathan Myers

- **Office Hours:** To be announced on the course web site
- **Email:** jonmyers@vt.edu

Web Sites:

- **Course Web Site:** <http://courses.cs.vt.edu/~cs4104/heath/Spring2004/index.php>
- **Blackboard (Course Grades):** <https://learn.vt.edu/>
- **CS@VT Forum:** https://forum.cs.vt.edu/forum_show.pl

Class Meets: Norris 306, 9:30–10:45 AM Tuesdays and Thursdays

Exams:

| | |
|--------------|----------------------------------|
| Midterm Exam | Thursday, March 4, 9:30–10:45 AM |
| Final Exam | Saturday, May 8, 3:25–5:25 AM |

CRN: 11501

Prerequisites:

- CS 2604, Data Structures and File Management
- MATH 3134, Applied Combinatorics and Graph Theory (or MATH 3124, Modern Algebra)

Textbook:

- **Required:** *Introduction to Algorithms*, Cormen, Leiserson, Rivest, and Stein

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.

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: March 4, 9:30–10:45 AM | 150 |
| Final exam: May 8, 3:25–5:25 AM | 250 |

A typical homework assignment consists of 2 or 3 problems or exercises, posted on the web site. All homework must be prepared with L^AT_EX or other word processing system and submitted as a stapled printout to a place to be specified on the assignment. Homework is due at 4:00 PM on the due date (see course calendar). **No late homework will be accepted.**

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.

Readings. For most weeks, there is a reading assignment to be completed by class time Tuesday morning. Each assignment consists of sections or chapters in the text.

Announcement

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

COURSE SCHEDULE

| DATE | SIGNIFICANT EVENT | TOPIC |
|-------------|---|---|
| 1/20 | Read Chapters 1, 2, and 3 | Overview: Problems, Efficiency, Analysis, Asymptotic Notation, Divide and Conquer |
| 1/27 | Read Sections 4.1–4.3; Appendices A and B | Summations and Recurrences; Discrete Math Review |
| 2/3 | Read Chapter 9 | Order Statistics |
| 2/10 | Read Chapter 13 | Red/Black Trees |
| 2/17 | Read Sections 16.1–16.3 | Greedy Algorithms |
| 2/24 | Read Chapter 15 | Dynamic Programming |
| 3/2 | Read Chapter 22 | Elementary Graph Algorithms |
| 3/4 | Midterm Exam—9:30–10:45 AM | |
| 3/8–12 | Spring Break | |
| 3/16 | Read Chapter 23 | Minimum Spanning Trees |
| 3/23 | Read Chapter 24 | Single-Source Shortest Paths |
| 3/30 | Read Chapter 25 | All-Pairs Shortest Paths |
| 4/6 | Read Sections 26.1–26.3 | Network Flow; Bipartite Matching |
| 4/13 | Read Chapter 32 | String Matching |
| 4/20 | Read Sections 34.1–34.3 | Polynomial Time and NP-Completeness |
| 4/27 | Read Sections 34.4–34.5 | Proving NP-Completeness |
| 5/4 | Last Day of Class | Discussion and review for final |
| 5/8 | Final Exam—3:25–5:25 AM | |

END OF SYLLABUS