

# Syllabus: CS 4104

## Data and Algorithm Analysis

### Spring, 2006

## 1 Information for Both Sections

**Instructor:** Lenwood S. Heath

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

**Teaching Assistants:**

	JOHN KORAH	XUMIN LIN
EMAIL	jkorah@vt.edu	xuminl@vt.edu
OFFICE HOURS	TBA	TBA
ROOM	133A McBryde Hall	133A McBryde Hall

**Web Site:** <http://courses.cs.vt.edu/cs4104/heath/Spring2006/index.php>

**Blackboard (Course Grades Only):** <https://learn.vt.edu/>

**Class Listserv:** L11634\_11635@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 Information Specific to First Section

CRN	11634
MEETING TIME	9:30 AM–10:45 AM; Tuesdays and Thursdays
CLASSROOM	McBryde 218
FINAL EXAM	Tuesday, May 9, 10:05–12:05
GRADER	John Korah

## 3 Information Specific to Second Section

CRN	11635
MEETING TIME	2:00 AM–3:15 PM; Tuesdays and Thursdays
CLASSROOM	McBryde 240
FINAL EXAM	Wednesday, May 10, 1:05–3:05
GRADER	Xumin Lin

## 4 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.

## 5 Grading Policy

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

<b>Homework assignments: 10 at about 60 points each</b>	600
<b>Midterm exam: March 16, 2006</b>	150
<b>Final exam: Dates above</b>	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  $\text{\LaTeX}$ <sup>1</sup> or other word processing system and submitted as a stapled printout, in class, on the due date<sup>2</sup>. **No late homework will be accepted.**

<sup>1</sup>See  $\text{\LaTeX}$  resources on the course web site.

<sup>2</sup>See Calendar on the course web site.

## **6 Readings**

For most classes, there is a reading assignment (see Section 9) to be completed by class time. Each assignment consists of sections in the textbook.

## **7 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.

## **8 Announcement**

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

## 9 Course Schedule

DATES	READING ASSIGNMENT	TOPICS
JANUARY		
1/17–1/19	Chapters 1, 2, and 3; Appendices A and B	Problems, complexity, analysis; asymptotics
1/24–1/26	Chapter 3; Sections 4.1–4.3	Recurrences; the master method
1/31–2/2	Sections 11.2–11.4	Hashing
FEBRUARY		
2/7–2/14	Sections 15.1–15.4	Dynamic programming
2/16–2/21	Sections 16.1–16.3	Greedy algorithms
2/23–2/28	Section 22.2–22.5	Depth-first search; strongly connected components
3/2	Section 23.1	Minimum spanning trees
MARCH		
3/6–3/10	SPRING BREAK	
3/14	Section 23.2	Prim's and Kruskal's algorithms
3/16	<b>Midterm Exam</b>	Topics through depth-first search
3/21–3/23	Sections 24.1–24.3	Single-source shortest paths; Bellman-Ford; Dijkstra
3/28–3/30	Section 25.2	All-pairs shortest paths; Floyd-Warshall
APRIL		
4/4–4/6	Sections 34.1–34.3	Polynomial time and NP-completeness
4/11–4/13	Sections 34.4–34.5	Proving problems NP-complete
4/18–4/20	Sections 35.1–35.3	Approximation algorithms
4/25–4/27	Sections 32.1–32.3	String matching
MAY		
5/2	<b>Last Day of Class</b>	Review for final; questions on homework solutions and course material
5/9	<b>Final Exam; First Section</b>	<b>10:05–12:05:</b> Comprehensive final exam
5/10	<b>Final Exam; Second Section</b>	<b>1:05–3:05:</b> Comprehensive final exam

END OF SYLLABUS