Syllabus: CS 4104
Data and Algorithm Analysis
Fall, 2011

1 General Course Information

CRN	91918
Meeting Time	8:00 AM–9:15 AM; Tuesdays and Thursdays
Classroom	Robeson 105
Final Exam	Monday, December 12, 10:05–12:05

Instructor: Lenwood S. Heath

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

Teaching Assistant: Nai-Ching Wang

- **Office Hours Held in:** TBA
- **Office Hours:** TBA
- **Email:** `naiching@vt.edu`

Web Site: `http://courses.cs.vt.edu/cs4104/heath/Fall2011/index.php`

Scholar (Course Grades Only): `https://scholar.vt.edu/`

Piazza: `http://www.piazza.com/`

Prerequisites:

- CS 2604, Data Structures and File Management, or CS 2606, Data Structures and OO Development, or CS 3114, Data Structures and Algorithms
- MATH 3134, Applied Combinatorics and Graph Theory, or MATH 3034, Introduction to Proofs

Required Textbook: Introduction to Algorithms (Third Edition). Cormen, Leiserson, Rivest, and Stein. MIT Press, 2009. ISBN: 978-0-262-03384-8.

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 13, 2011	150
Final exam: Monday, December 12, 10:05–12:05	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		
8/22–8/26	Chapters 1 and 2	Problems, complexity, analysis
8/29–9/2	Chapter 3; Section 15.1	Asymptotics; dynamic programming
September		
9/5–9/9	Sections 15.2–15.4	Dynamic programming
9/12–9/16	Sections 16.1–16.3	Greedy algorithms
9/19–9/23	Section 22.1–22.4	Depth-first search; topological sort
9/26–9/30	Section 23.1–23.2	Substitution arguments; minimum spanning trees
October		
10/3–10/7	Sections 24.1–24.3	Single-source shortest paths; relaxation; Bellman-Ford; Dijkstra
10/10-10/14	Sections 25.1–25.2	All-pairs shortest paths; Floyd-Warshall; transitive closure
10/13	**Midterm Exam**	Topics through single-source shortest paths
10/17–10/21	Sections 34.1–34.2	Polynomial time; optimization and decision problems; encoding problems
10/24–10/28	Sections 34.2–34.3	Polynomial-time reductions and NP-completeness
November		
10/31–11/4	Sections 34.4–34.5	Proving problems NP-complete
11/7–11/11	Sections 32.1–32.3	String matching
11/14–11/18	Sections 35.1–35.3	Approximation algorithms
11/21–11/25	Thanksgiving Break	
11/28–12/2	Sections 26.1–26.3	Maximum flow; maximum bipartite matching
December		
12/6	**Last Day of Class**	Review for final; questions on homework solutions and course material
12/12	**Final Exam**	**10:05–12:05:** Comprehensive final exam

End of Syllabus