Syllabus: CS 5114
Theory of Algorithms
Spring, 2012

1 General Course Information

CRN	12080
Meeting Time	11:00 AM–12:15 PM; Tuesdays and Thursdays
Classroom	Randolph 206
Final Exam	Friday, May 4, 10:05–12:05

Instructor: Lenwood S. Heath

- **Office:** 2160J Torgersen Hall
- **Office Hours:** 1:00–3:00 Tuesdays and Thursdays
- **Email:** `heath@vt.edu`

Teaching Assistant: Vishwas Rao

- **Office Hours Held in:** McBryde 110
- **Office Hours:** 8:30–10:45 Tuesdays; 8:30–10:00 Wednesdays
- **Email:** `visrao@vt.edu`

Web Site: `http://courses.cs.vt.edu/cs5114/spring2012/index.php`

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

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

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 the **computational complexity** of a problem, the **efficiency** of an algorithm for solving a problem, **techniques** for designing algorithms, and the **inherent intractability** of certain problems. Skills that the student will take away from this course include: (1) determining whether a problem is NP-complete, (2) analyzing the time complexity of an algorithm, and (3) applying techniques for designing efficient algorithms.

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: March 15, 2012	150
Final exam: Friday, May 4, 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 or chapters 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
	January	
1/16–1/20	Chapters 1, 2, 3, and 4	Problems, complexity, analysis
1/23–1/27	Chapters 7 and 9	Divide and conquer — Mergesort, Quicksort, order statistics
1/30–2/3	Chapter 15	Dynamic programming
	February	
2/6–2/10	Chapter 16	Greedy algorithms
2/13–2/17	Chapter 23	Minimum spanning trees
2/20–2/24	Chapter 34	Encoding problems; polynomial time (P); polynomial-time verification (NP)
2/27–3/2	Chapter 34	NP-completeness and reducibility
	March	
3/5–3/9	Spring Break	
3/12-3/16	Chapter 34	NP-completeness proofs
3/15	**Midterm Exam**	Topics through polynomial-time verification
3/19–3/23	Chapter 34	NP-complete problems
3/26–3/30	Sections 35.1–35.3	Approximation algorithms
	April	
4/2–4/6	Chapter 32	String matching
4/9–4/13	Chapter 33	Computational geometry
4/16–4/20	Sections 26.1–26.2	Maximum flow
4/23–4/27	Section 26.3	Maximum bipartite matching
	May	
5/1	**Last Day of Class**	Review for final; questions on homework solutions and course material
5/4	**Final Exam**	**10:05–12:05:** Comprehensive final exam

End of Syllabus