Syllabus: CS 5114
Theory of Algorithms
Spring, 2015

1 General Course Information

CRN	12315
Meeting Time	11:00 AM–12:15 PM; Tuesdays and Thursdays
Classroom	McBryde 321
Final Exam	Friday, May 8, 10:05–12:05

Instructor: Lenwood S. Heath

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

Teaching Assistant: Nabanita Maji

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

Web Site: `http://courses.cs.vt.edu/cs5114/spring2015/index.php`

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

Piazza: `http://piazza.com/vt/spring2015/cs5114`

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 5, 2015	150
Final exam: Friday, May 8, 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 PDF to Scholar by 5:00 PM 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	
1/20–1/23	Chapters 1, 2, 3, and 4	Problems, complexity, analysis
1/26–1/30	Chapters 7 and 9	Divide and conquer — Mergesort, Quicksort, order statistics
	February	
2/2–2/6	Chapter 15	Dynamic programming
2/9–2/13	Chapter 16	Greedy algorithms
2/16–2/20	Chapter 23	Minimum spanning trees
2/23–2/27	Chapter 34	Encoding problems; polynomial time (P); polynomial-time verification (NP)
	March	
3/2–3/6	Chapter 34	NP-completeness and reducibility
3/5	**Midterm Exam**	Topics through polynomial-time verification
3/9–3/13	Spring Break	
3/16-3/20	Chapter 34	NP-completeness proofs
3/23–3/27	Chapter 34	NP-complete problems
3/30–4/3	Sections 35.1–35.3	Approximation algorithms
	April	
4/6–4/10	Chapter 32	String matching
4/13–4/17	Chapter 33	Computational geometry
4/20–4/24	Sections 26.1–26.2	Maximum flow
4/27–5/1	Section 26.3	Maximum bipartite matching
	May	
5/5	**Last Day of Class**	Review for final; questions on homework solutions and course material
5/8	**Final Exam**	**10:05–12:05:** Comprehensive final exam

End of Syllabus