Syllabus: CS 5114
Theory of Algorithms
Spring, 2017

1 General Course Information

CRN	12634
Meeting Time	3:30 PM–4:45 PM; Tuesdays and Thursdays
Classroom	McBryde 307
Final Exam	Saturday, May 6, 7:45AM–9:45AM

Instructor: Lenwood S. Heath

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

Teaching Assistant: Jacob S. Porter

- **Office Hours Held in:** 108/110 McBryde Hall
- **Office Hours:** 1:30–3:30 Wednesdays and Fridays
- **Email:** `jsporter@vt.edu`

Web Site: `http://courses.cs.vt.edu/cs5114/spring2017/index.php`

Canvas (Grades Only): `https://canvas.vt.edu/`

Piazza: `http://piazza.com/vt/spring2017/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 2, 2017	150
Final exam: Saturday, May 6, 7:45AM–9:45AM	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 Canvas 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	
1/17–1/20	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)
2/27–3/3	Chapter 34	NP-completeness and reducibility
	March	
3/2	**Midterm Exam**	Topics through polynomial-time verification
3/6–3/10	Spring Break	
3/13-3/17	Chapter 34	NP-completeness proofs
3/20–3/24	Chapter 34	NP-complete problems
3/27–3/31	Sections 35.1–35.3	Approximation algorithms
	April	
4/3–4/7	Chapter 32	String matching
4/10–4/14	Chapter 33	Computational geometry
4/17–4/21	Sections 26.1–26.2	Maximum flow
4/24–4/28	Section 26.3	Maximum bipartite matching
	May	
5/2	**Last Day of Class**	Review for final; questions on homework solutions and course material
5/6	**Final Exam**	**7:45AM–9:45AM:** Comprehensive final exam

End of Syllabus