Syllabus: CS 4114
Formal Languages and Automata Theory
Spring, 2012

1 General Course Information

CRN	12066
Meeting Time	8:00 AM–9:15 AM; Tuesdays and Thursdays
Classroom	McBryde 126
Final Exam	Monday, May 7, 2:05–4:05

Instructor: Lenwood S. Heath

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

Teaching Assistant: Ted Ahn

- **Office Hours Held in:** McBryde 110
- **Office Hours:** 9:30–11:30 Tuesdays; 3:30–5:00 Wednesdays
- **Email:** `thahn@vt.edu`

Web Site: `http://courses.cs.vt.edu/cs4114/spring2012/index.php`

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

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

Prerequisites:

- MATH 3134, Applied Combinatorics and Graph Theory, or MATH 3034, Introduction to Proofs

Required Textbook: Languages and Machines (Third Edition). Thomas A. Sudkamp. Pearson Education, Inc., 2006. ISBN: 0-321-32221-5.

2 Course Description

This course presents formal models for the computation of functions and for the recognition and generation of languages. The central goal is to define the four language classes in the Chomsky hierarchy in terms of grammars that generate each class and in terms of automata that recognize each class. Contents of the course are largely mathematical, including mathematical proofs and especially proofs by induction.

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: Monday, May 7, 2:05–4:05	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 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	Chapter 1	Math review — sets, recursive definitions, proof by induction
1/23–1/27	Chapter 2	Languages; regular sets
1/30–2/3	Chapter 3	Context-free grammars; language generation
	February	
2/6–2/10	Chapter 3	Context-free grammars; examples; regular grammars
2/13–2/17	Chapter 18	Parsing — top-down, bottom-up
2/20–2/24	Chapter 4	Normal forms; Chomsky normal form
2/27–3/2	Chapter 5	Deterministic and nondeterministic finite automata
	March	
3/5–3/9	Spring Break	
3/12-3/16	Chapter 5	Regular languages
3/15	**Midterm Exam**	Topics through normal forms
3/19–3/23	Chapter 6	Regular languages; Pumping Lemma; state minimization
3/26–3/30	Chapter 7	Pushdown automata; Pumping Lemma; closure properties
	April	
4/2–4/6	Chapter 19	Deterministic parsing — LL(k) grammars
4/9–4/13	Chapter 8	Turing machines; accepting languages
4/16–4/20	Chapter 8	Turing machines; variations; nondeterministic
4/23–4/27	Chapter 10	Chomsky hierarchy
	May	
5/1	**Last Day of Class**	Review for final; questions on homework solutions and course material
5/7	**Final Exam**	**2:05–4:05:** Comprehensive final exam

End of Syllabus