sylcs422-2013a

CS 422 – Automata Theory

West Virginia University
fall semester 2014
August 26, 2014
syllabus 1.0

Course location:	355 ESB, Evansdale Campus
Course times:	Tuesdays and Thursdays, 11:00-12:15
Course Format and Credit Hours:	3 hours lecture 3 credit hours
Prerequisites:	CS 220 Discrete Mathematics
Instructor:	Frances L. Van Scoy 304.293.0960 frvanscoy@mail.wvu.edu
Office Hours:	9:30-10:45; 12:30 and 1:45 Tuesday and Thursdays 827 ESB
Course Objectives:	Theory and practice of the construction of programming language translators; scanning and parsing techniques, semantic processing, runtime storage organization, and code generation; design and implementation of interpreter or a compiler by students.
Expected Learning Outcomes:	Understand automata as models of computation and language recognizers. Be able to design automata for specific languages. Be able to define various automata and describe their relative computational power. Understand formal grammars as language generators. Be able to define various grammars. Understand the relationship between automata and grammars. Be able to prove properties of formal languages.
Required Text:	John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman Automata Theory, Languages, and Computation, 3rd edition Pearson / Addison-Wesley, 2007

"Compiler construction" is one of the earliest success stories for computer science. That is, there was a real problem to solve--how to translate notation easily written and understood by humans into strings of binary digits understood by a computer--for which a rather elegant body of theory provided much of the solution.

"Automata theory" is the theory that made the success of compiler construction possible.

The organizing theme for this course is:

the Chomsky hierarchy:

regular expressions, context free, context sensitive, phrase structure'

finite automata, pushdown automata, linear bounded automata, Turing machines

Course outline

	Date	Lecture Topic	Text chapters
1	"August 19	introduction to automata theory	1
2	"August 21	Type 3: deterministic finite automata	2
3	"August 26	Type 3: nondeterministic finite automata	
4	"August 28	Type 3: finite automata with epsilon transitions	
5	"September 2	Type 3: regular expressions	3
6	"September 4	Type 3: left linear grammars and right linear grammars	
7	"September 9	Type 3: properties of regular languages	4
8	"September 11	Type 3: applications of regular expressions; decision properties for regular languages; equivalence and minimization algorithms for regular languages	
9	"September 16	Type 2: context free grammars	5
10	"September 18	Type 2: nondeterministic pushdown automata	6
11	"September 23	Type 2: deterministic pushdown automata	
12	"September 25	test 1 (regular languages)	
13	"September 30	type 2: normal forms of context free grammars; pumping lemma for context free languages	
14	"October 2	Type 2: properties of context free languages	7
15	"October 7	Type 2: decision properties of context free languages	
16	"October 9	Type 1: context sensitive languages	
16	"October 14	(no class)	
17	"October 16	Type 1: linear bounded automata	
18	"October 21	Type 0: Turing machines	8
19	"October 23	Type 0: kinds of Turing machines	
20	"October 28	Type 0: restrictions of Turing machines	
21	"October 30	undecidability (1)	9
	"November 4	(no class)	
22	"November 6	undecidability (2)	
23	"November 11	test 2 (context free and context sensitive languages)	
24	"November 13	reductions	10
25	"November 18	P and NP classes of problems	
26	"November 20	some NP-complete problems	
	"November 25	(no class)	
	"November 27	(no class)	
27	"December 2	additional classes of problems; additional classes of automata	11
28	"December 4	test 3 (recursive and recursively enumerable languages)	
29	"December 9	L-systems	

Grading

Grading:	12 Gradiance assignments @ 4%	48%
	first and second tests @ 20	40%
	third test @ 12%	10%
Grading scale:	A	90-100%
	B	80-89%
	C	70-79
	D	60-69%
	F	0-59%

48% of the course grade is based on reading assignments in the Hopcroft text book evaluated by 12 weekly assignments via Gradiance. The first one is due 11:59 pm, Friday, August 29.

Go to www.newgradiance.com to set up a free account.
Your class token is **D857A482 .**

The three tests will be open books, notes, references, computers.

Lectures, the text book, course handouts, other reading assignments, and experience gained from doing assignments are all fair game for the tests and exam. There may be additional reading assignments (for example, from ACM publications available online through WVU Libraries) for which you will be responsible on the tests. Details about these reading assignments will be given in class and on the distributed notes from lecture.

I'll distribute some notes via email, so you may wish to borrow a laptop for use during tests to access those notes.

Policies

Attendance is a not a factor in computing the grade, EXCEPT:
(1) you are responsible for all material presented, handouts distributed, announcements made, etc., in class
(2) if you miss a test or exam without prior approval, your grade on that test or exam will be 0

If you copy someone else's answers on a test, knowingly allow someone to copy from your test, turn in someone else's work as your own, or cheat in any other way, you can receive a failing grade in this course. There may also be further disciplinary measures. The penalty will always be more severe than a failing grade in the test or assignment involved.

I expect to send frequent messages to the class via email using the MIX system. You should either check your MIX email account daily or forward your MIX email to an account where you check mail daily.

I recommend that you read the assigned chapters in the text book at least three times:
(1) a quick reading, looking for points you don' t understand before the indicated lecture
(2) a carefully reading being careful to understand everything soon after the indicated lecture
(3) a review reading before the first test on the chapter