COMP 310 Fall 2015

Automata, Languages and Computation

Class Section Number: 15455

INSTRUCTOR: Diane Schwartz

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OFFICE HOURS: TTH 9:30 – 10:30

PREREQUISITES: Comp 256/L with C- or better

COURSE DESCRIPTION: Study of the relation of languages (i.e. sets of strings) and machines for processing these languages, with emphasis on classes of languages and corresponding classes of machines. Phrase structure languages and grammar. Types of grammar and classes of languages. Regular languages and finite state automata. Context-free languages and pushdown automata. Unrestricted languages and Turing Machines. Turing computability model. Undecidability.

REQUIRED TEXTBOOK: Introduction to Formal Languages and Automata (Fifth Edition),

 Peter Linz, Jones and Bartlett, Inc. 2012

GRADING: The following weights will be applied to calculate your final grade:

 Midterms (4) 80% (20% each)

 Quizzes on Homework 10%

 Class Participation 10%

Plus and minus grading will be used. Your final percentage score will be mapped onto a letter grade as follows: 90 – 100% (A-, A); 80-89%(B-,B,B+); 70-79% ( C or C+); 65-69%( C-); 60-64%( D); Below 60% (F).

COURSE OBJECTIVES

A successful student will be able to:

1. Write regular expressions, construct deterministic and nondeterministic finite automata.
2. Convert from any of the three representations for regular languages to any of the others.
3. Prove when a language is not regular.
4. Construct context-free grammars and push-down automata for context-free languages.
5. Prove when a language is not context-free.
6. Construct Turning machines. Understand the ability of Turing machines to describe any algorithm.
7. Have an appreciation for undecidability and the notions needed to prove it.

Additional Class Information

1. Class participation counts for 50 points and will be weighted as 10% of your grade. You can miss 3 classes without any penalty. You will lose 5 points for every class missed beyond 3 classes. You cannot lose more than 50 points.
2. Homework will be assigned but will not be collected or graded. Quizzes will test students on homework material.
3. Students are expected to read and abide by the University's Academic Honesty statement printed in the current catalog. Academic dishonesty will result in a zero on the assignment and can result in class failure.

Class Etiquette

1. No use of cell phones, lap tops or other communication/computer devices is allowed. You should have your full attention on the class.
2. Please do not eat in class. Don’t bring in breakfast, lunch, dinner or snacks to eat in class. Bottles of water, small sodas or cups of coffee or tea are ok.
3. Come to class on time and do not leave early. The attendance sign-up sheet will be available only at the beginning of class.
4. Full participation in class activities is expected.

COURSE OUTLINE (Tentative)

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| **Lectures** | **Topics** | **Text Reading** |
|  |  |  |
| 8/25, 8/27 | Formal Languages, Finite Automata | Chap 1,2  |
| 9/1, 9/3 | Finite Automata, Non-deterministic finite automata | Chap 2 |
| 9/8, 9/10 | Regular Languages and Regular Expressions | Chap 3 |
| 9/15 | Regular Grammars, Closure Properties of Regular Languages | Chap 4 |
| **9/17** | **Midterm 1** |  |
| 9/22, 9/24 | Pumping Lemma for Regular Languages | Chap 4 |
| 9/29, 10/1 | Context Free Grammars, Parsing | Chap 5 |
| 10/6, 10/8 | Simplifying Grammars, CFG and Normal Forms | Chap 5, 6 |
| 10/13 | Pushdown Automata | Chap 7 |
| **10/15** | **Midterm 2** |  |
| 10/20, 10/22 | Pushdown Automata  | Chap 7 |
| 10/27, 10/29 | Pushdown Automata | Chap 7 |
|  11/3, 11/5 | Pumping Lemma for CFL, Closure Properties of CFL | Chap 8 |
| 11/10 | Pumping Lemma for CFL, Closure Properties of CFL | Chap 8 |
| **11/12** | **Midterm 3** |  |
| 11/17, 11/19 | Turning Machines | Chap 9 |
| 11/24 | Turning Machines | Chap 10 (parts) |
| 12/1, 12/3 | Recursively Enumerable Lang, Decidability | Chap 11,12 (parts) |
| 12/8 | **Midterm 4** |  |
| **No final exam** |  |  |

**See course Moodle site for other class information.**