CS622: Theory of Formal Languages

FALL 2019

Professor Dan Simovici
Office: Science Bldg., 3rd floor, room 173
Office hours: Monday and Wednesday 3:30 – 4:30

In this course we present the basic aspects of formal languages, a theoretical Computer Science discipline inspired by mathematical linguistics and by the study of syntactic aspects of programming languages. The main reference in this course is our book *Theory of Formal Languages with Applications* (World Scientific, 1999) by Dan Simovici and R. L. Tenney. We shall cover the following topics:

- ***Words and Languages***
- ***Regular Languages:*** deterministic and nondeterministic automata, transition systems, closure properties, pumping lemma, minimal automata, syntactic monoids
- ***Grammars:*** Chomsky's hierarchy, regular operations
- ***Context-Free Languages:*** derivations and derivation trees, fixed-points and context-free languages, the pumping lemma, closure properties, regular and context-free languages, ambiguity
- ***Pushdown Automata:*** deterministic and non-deterministic pushdown automata
- ***Applications of formal language theory:*** coding theory, applications in molecular biology

The grade in this course is determined essentially by two tests: a mid-term and a final test, both with open books. Of course, both examinations will consist of problems. The grade is also influenced by the quality of your homework. I insist on both the substance and the presentation of your homework. Please write neatly and clearly. I recommend that you learn LaTeX and typeset your homework in this language.

Academic integrity will be strongly enforced. Your homework must be your own product. You may consult with your colleagues, but you must be the sole author of your solutions.

Homeworks will be posted on the site of this course (www.cs.umb.edu/~dsim/cs622). Please consult this site each time when a homework is announced in class.