CSIE 3110: Formal Languages and Automata Theory
(Semester 1, 2016–2017)

Course website

http://www.csie.ntu.edu.tw/~tonytan/teaching/2016a-aut/2016a-aut.html

Description

In this course we will cover an introduction to some basic ideas in the theory of computation centering around the question: "What it means for a problem to be computable?"

Prerequisite

Discrete mathematics and some mathematical maturity, i.e., comfortable with reading and writing mathematical proofs.

Tentative syllabus

	Week	Topic	Remarks
A	1	Preliminaries	HW 1 out.
B	2	Deterministic finite state automata	HW 1 due.
	3	Non-deterministic finite state automata	HW 2 out.
	4	Regular expressions and pumping lemma	–
C	5	Context-free languages	–
	6	Push-down automata	HW 2 due. HW3 out.
	7	Deterministic push-down automata	–
	8	Reading week	–
	9	Midterm exam	HW 3 due.
D	10	Turing machines and decidable languages	–
	11	Undecidable languages	HW 4 out.
	12	Reducibility	–
	13	Recursion theorem	–
E	14	Time and space complexity	HW 4 due.
	15	NP-completeness: Cook-Levin theorem	HW 5 out.
	16	Polynomial time reductions	–
	17	Reading week	–
	18	Final exam	HW 5 due.

Textbook

- *Introduction to the Theory of Computation* by M. Sipser.

- *Introduction to Automata Theory, Languages, and Computation* by J. Hopcroft and J. Ullman, 1st edition.

Grading

- Five assignments weigh 10% each.
- The midterm and final exams weigh 25% each.