CS 1502: Formal Methods in Computer Science

FALL, 2025

INSTRUCTOR: YANG, NING
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OFFICE HOURS: 9:00 AM-12:00AM
TEACHING ASSISTANT: Xian, Guanmeng

PREREQUISITE: Discrete Mathematics, Programming, Data Structure, Algorithm Analysis and Design, Computer Architecture, OS Principles,

DESCRIPTION:
The course is an introduction to the theory of information and computation as a physical phenomenon. The course covers standard formalization of computational concepts and proofs of noteworthy implications of these formalization. Typical topics include: fi nite automata, decidability, reducibility, and complexity.

COURSE OBJECTIVES:
 Study of various models of computation; capabilities and properties of the models and the ir limitations.

LEARNING OUTCOMES FOR THIS COURSE:
After finishing this course, we can answer the
questions as follows:
1. What is computation?
2. What is efficient computation?
3. Which problems are computable?
4. Which problems are tractable?

GRADE DETERMINATION:

FINAL EXAM: 40%

QUIZZES AND ASSIGNMENTS: 50%

HOMEWORK: 50%

ATTENDANCE: 10%

MATERIAL COVERED: The sequence of the sections covered in this class is:

Week	Contents	Descriptions
1-2	UNIT 1	Finite Automata
3	UNIT 2	Regular Language
4-5	UNIT 3	Context-Free Language

6	UNIT 4	Pushdown Automata	
7-8	UNIT 5	Turing Machine	
9-11	UNIT 6	Computability (Decidability)	
12-13	UNIT 7	Computational Complexity	
14-15	UNIT 8	Intractable Problems	
16		Final Exam Week	