

CSCE 355 - Foundations of Computation

Credit Hours: 3 hours

Contact Hours: 3 lecture hours

Instructor: Dr. Steve Fenner

Required Textbooks: J. E. Hopcroft, R. Motwani, and J. D. Ullman, *Automata Theory, Languages, and Computation (3rd Edition)*. Addison-Wesley-Pearson 2007.

Bulletin Description: Basic theoretical principles of computing as modeled by formal languages, grammars, automata, and Turing machines; fundamental limits of computation.

Prerequisites: CSCE 211, 212, 350

Required Course in CS program, Selective Elective in CE

Learning Outcomes: Students will be able to:

1. Prove theorems in discrete math by induction, contradiction, or cases
2. Analyze, design, and manipulate finite state acceptors
3. Design and manipulate regular expressions
4. Prove languages not regular or context-free
5. Design and analyze context-free grammars and push-down automata
6. Analyze and simulate a Turing machine
7. Prove problems undecidable via reduction

Student (Program) Outcomes addressed by course (Detailed mappings of these course outcomes to the Student Outcomes of the programs are in the detailed syllabus and the Assessment plan.)

Student Program Outcomes	SOs supported	SOs Moderately supported
Computer Engineering	a, c	e
Computer Information Systems		
Computer Science	a, c, CS-j	b, CS-k

Topics covered:

1. Proof techniques, numbers, sets, relations
2. Deterministic and nondeterministic finite automata
3. Regular expressions and regular languages
4. Grammars, push-down automata, and context-free languages
5. Turing machines and undecidability