

COURSE OUTLINE OF RECORD

Dept., Number	CSC 4386	Course Title	Automata, Formal Languages and Computability
Semester Hours	3		
Year	2006	URL (if any):	

Current Catalog Description:

This course provides an introduction to computer science theory and the mathematical foundations of digital computers. Its topics include the family of computing machines (finite-state, push-down, and Turing), the Chomsky hierarchy of languages, decidability, unsolvable problems, and applications of automata to areas of syntactic analysis, modeling and artificial intelligence. Prerequisites: CSC 4340 and MAT 2337 or consent of Department Chair (Cross-listed with MAT 4386.)

Textbook:

Introduction to the Theory of Computation, Second Edition by Michael Sipser, Thompson Course Technology

Course Goals:

1. Study the mathematical models of computing machines and the inputs (languages) on which they can work.
2. Study the mathematical theories of computation.
3. Learn the mathematical limitations of computation.

Prerequisites by Topic:

1. Some experience with mathematical abstraction
2. Mathematical induction
3. Stacks, trees, and graphs
4. Computer languages' syntax rules and recognizers

Major Topics Covered in the Course (number of weeks):

1. Automata theory:
 - Mathematical background, languages, recursive definitions, regular expressions (6.5)
 - Machines: finite automata, transition graphs, finite automata w/ output (5.5)
 - Kleene's theorem (4.5)
 - Regular and nonregular languages (5.0)
 - Decidability (3.0)
2. Pushdown automata theory:
 - Context-Free Grammars (7.0)
 - Pushdown automata (4.0)
 - Context-free and non-context-free languages (2.0)
 - Decidability (1.0)
3. Turing theory:
 - Turing machines (2.0)
 - Turing machine languages and the halting problem (2.0)
4. Ethics: Paper assigned

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Estimate Curriculum Category Content (Semester hours)

Area	Core	Advanced	Area	Core	Advanced
Algorithms		1	Data Structures		
Software Design			Prog. Languages		
Comp. Arch.					

Oral and Written Communication:

Every student is required to submit one written paper (1.5 to 2 pages single-spaced) on a topic involving computer ethics.

Social and Ethical Issues:

Every student is required to submit one written paper (1.5 to 2 pages single-spaced) on a topic involving computer ethics.

Theoretical Content:

Almost all of the course can be considered theoretical. See the **Major Topics** section.