

Spring 2012 CIS 511 Theory of Computing: Syllabus

Text: *Introduction to the Theory of Computation (Second Edition)* Michael Sipser

Review of regular languages and finite automata (Ch. 1)	3 lectures
Design of finite automata	
Non-determinism	
Equivalence of NFAs, DFAs, regular expressions	
Closure, Pumping Lemma	
Review of Context-free languages (Ch. 2)	3 lectures
Grammars, ambiguity, normal forms, parsing	
Push-down automata	
Closure and pumping lemma	
Turing Machine Model (Ch. 3)	3 lectures
Church-Turing thesis	
Variants and examples	
Non-determinism	
Recognizers and Enumerators	
Decidability (Ch. 4)	3 lectures
Universal TMs	
Recognizers and Deciders	
Diagonalization, Halting Problem	
*Reducibility	
Time Complexity (Ch. 7)	4 lectures
Classes P and NP	
NP-completeness	
Cook-Levin Theorem	
Space Complexity (Ch. 8)	4 lectures
Savitch's Theorem	
PSPACE and PSPACE-completeness	
Classes L and NL	
NL-completeness	
Hierarchy Theorems (from Ch. 9)	1 lecture
Approximation and Approximability (from Ch. 10)	2 lectures
Probabilistic Complexity Classes (from Ch. 10)	3 lectures
Parallel Computation and Circuit Complexity (from Ch. 10)	3 lectures