CS181 Spring 2020		Required Text: Introduction to the Theory of Computation, Third Edition, Michael Sipser, Cengage Learning	
Week	**Topics**	**Sipser sections, pages (approx.)**	**Date**
1	Preliminaries, Overview, Review Discrete Math Structures; Strings & Formal Languages; Deterministic Finite Automata (DFA), Finite State Languages (FSLs)	0.2-0.4, pp 3-24; 1.1, pp 31-47	Tue Mar 31
	Examples of FSLs & Non-FSLs; Nondeterministic Finite Automata (NFA)	1.4, pp 77-82; 1.2, pp 47-54	Thu Apr 2
2	Classes of Languages, Closure Properties of FSLs; Constructions for DFAs & NFAs; Recognizers vs. Generators vs. Transducers	1.2, pp 58-63; Exer 1.14a; 1.1, pp 35-36	Tue Apr 7
	Regular Expressions & Regular Languages; Prove NFA = DFA	1.3, pp 63-69; Th. 1.39, pp 54-58	Thu Apr 9
3	Generalized NFA (GNFA); Intro to Context Free Grammars (CFGs) & CF Languages (CFLs); Derivations, Parse Trees, & Ambiguity	1.3, pp 66-70; 2-2.1, pp 101-110	Tue Apr 14
	Intro to Pumping Lemma for FSLs; Application of Pumping Lemma for FSLs	1.4, pp 77-82	Thu Apr 16
4	Prove NFA = GNFA = Regular Expressions; Review Application of Pumping Lemma for FSLs	1.3, pp 66-70	Tue Apr 21
	Prove Pumping Lemma for FSLs; Closure Properties of CFLs	1.4, pp 78-79; 2.1, pp 101-110	Thu Apr 23
5	Review for Midterm; Normal Forms for CFGs; Finite State Transducers	2.1, pp 108-110; Exer 1.24, p 87	Tue Apr 28
	Midterm Exam (4:00-5:45pm at Lakretz 110): Weeks 1-4	**Weeks 1-4**	Thu Apr 30
6	Intro to (Nondeterministic) PDAs; Review Closure Properties of FSLs & CFLs	2.2, pp 111-116	Tue May 5
	Pumping Lemma for CF Languages; Start Proof: PDAs = CFLs	Th. 2.34, pp 125-129; 2.2, Th. 2.20, pp 117-125	Thu May 7
7	Finish Proof: PDAs = CFLs; Intro to Deterministic PDAs (DPDAs) & Deterministic CFLs (DCFLs); Closure Properties of DCFLs vs. CFLs	2.2, Th. 2.20, pp 117-125; 2.4, pp 130-151; 2.4, pp 133-135	Tue May 12
	Deterministic CF Grammars (DCFGs); Application of DCFGs to Compiler Construction; Intro to (Deterministic) Turing Machines (TMs)	2.4, Lemmas 2.58-59, pp 135-146; 2.4, pp 151-154; 3.1, pp 165-175	Thu May 14
8	Formal Computability Theory: Algorithms (Always Halting TMs) & Procedures (General TMs); Church-Turing Thesis	3.3, pp 182-184; 3.1, p 170; Fig. 3.22, p 183	Tue May 19
	Universal TM; The Halting Problem	Th 4.11, p 202; 4.1-2, pp 193-214	Thu May 21
9	Variants of TMs: Nondeterministic TMs & others; Constructions for TM Algorithms and TM Procedures;	3.2, pp 176-181	Tue May 26
	Review for Final; Goedel's Theorem (time permitting)	3.2, pp 176-180; 6.2, pp 252-259	Thu May 28
10	Intro. to Complexity Theory; The "P=NP?" Problem; Reductions & Completeness; Review for Final	7.1, pp 275-284; 7.2-7.3, pp 284-298; 7.4, pp 298-311	Tue Jun 2
	Review for Final		Thu Jun 4
F	**Final Exam (3:00-5:45pm at Room TBD): Weeks 1-9**	**Weeks 1-9**	**Thur June 11**