

Theory of Computation (CS305) Spring 2019

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Course Description: The subject - theory of computation, comprises the fundamental mathematical properties of computer hardware, software, and certain applications thereof. In studying this subject, we seek to determine what can and cannot be computed, how quickly, with how much memory, and on which type of computational model; to see a new, simpler, and more elegant side of computers, which we normally consider to be complicated machines; to learn conceptual tools that practitioner use in computer engineering. The main topics/subtopics covered will be:

	Topics	Sub-topics
Automata and Languages	Regular Languages	DFA, NFA, Regular Expressions
	Context-free Languages	Context-free grammars, PDA, Deterministic Context-free grammars
Computability Theory	The Church-Turing Thesis	Turing Machines, Algorithm definition
	Decidability	Decidable languages, Un-decidability
	Reducibility	Mapping Reducibility
Complexity Theory	Time Complexity	The class P, class NP, NP completeness
	Intractability	

Grading: Your final grade in the course will be calculated as per the policy given in Table 1.

Evaluation Type	Weightage		Letter Grade	Percentage Bracket
Mid Term	20%		F	< 40
Assignments ¹	60%		D-	40 – 44
Final Term	20%		D	45 – 49
			D+	50 – 54
			C-	55 – 59
			C	60 – 64
			C+	65 – 69
			B-	70 – 74
			B	75 – 79
			B+	80 – 84
			A-	85 – 90
			A	> 90

Table 1: Grading Policy

Course Format: Beside two 90-minute weekly lectures, the course will have a mandatory 60-minute session per week. A regular 60-minute slot will be decided in the first week of

¹“Assignments” - will include all or some of the following: theory/programming home work, in-class quizzes, weekly in-class tests and course project.

the course. This session will be used primarily to hold weekly test and to enforce concepts and techniques learned in class.

Text Book: Introduction to the Theory of Computation, 3rd edition. Michael Sipser. CENGAGE Learning. It is expected that you have a copy of your own.

Late homework policy: Late or improperly submitted homework will not be accepted. If you know in advance that you will be unable to submit your homework at the correct time, you must make special arrangements ahead of time. Theory assignments must be written neatly and well organized. If it's not readable, it won't be graded. You should strongly consider starting with a rough draft, especially on problems requiring a proof. You might consider taking the opportunity to learn LATEX.

Academic dishonesty: Many students find it helpful to consult their peers while doing assignments. This practice is legitimate and to be expected. However, it is not acceptable practice to pool thoughts and produce common answers. To avoid this situation, it is suggested that students not write anything down during such talks, but keep mental notes for later development of their own. Students who allow their files or assignments to be copied are as guilty of academic dishonesty as those who copy and will be treated accordingly. Major occurrences of academic dishonesty, such as the submission of work that is not the student's own, will be dealt with according to the Ashoka University's academic honesty document.

How much work is expected: The amount of work will vary, depending on your background and the ease with which you follow mathematical ideas. However, 10-12 hours per week is a good guess.