

Theory of Automata					
Credit Hours:	3	Course Code:	COSC-2105	Prerequisites:	None
Course Learning Outcomes (CLOs):					
At the end of the course, the students will be able to:				Domain	BT Level*
1. Explain and manipulate the different concepts in automata theory and formal languages such as formal proofs, automata, regular expressions, Turing machines etc.				C	2
2. Prove properties of languages, grammars and automata with rigorously formal mathematical methods				C	2
3. Design of automata, RE and CFG				C	3
4. Transform between equivalent NFAs, DFAs and REs				C	3
5. Differentiate and manipulate formal descriptions of languages, automata and grammars with focus on regular and context-free languages, finite automata and regular expressions.				C	3
* BT= Bloom’s Taxonomy, C=Cognitive Domain, P=Psychomotor Domain, A=Affective Domain					
#	SDG	Relevant CLOs			
1	SDG 4: Quality Education	CLO 1: Explain and manipulate the different concepts in automata theory and formal languages such as formal proofs, automata, regular expressions, Turing machines etc. CLO 5: Differentiate and manipulate formal descriptions of languages, automata and grammars with focus on regular and context-free languages, finite automata and regular expressions.			
Course Contents:					
Finite State Models: Language definitions preliminaries, Regular expressions/Regular languages, Finite automata (FAs), Transition graphs (TGs), NFAs, Kleene’s theorem, Transducers (automata with output), Pumping lemma and non-regular language Grammars and PDA: CFGs, Derivations, derivation trees and ambiguity, Simplifying CFLs, Normal form grammars and parsing, Decidability, Context sensitive languages, grammars and linear bounded automata (LBA), Chomsky’s hierarchy of grammars Turing Machines Theory: Turing machines, Post machine, Variations on TM, TM encoding, Universal Turing Machine, Defining Computers by TMs.					
Teaching Methodology:					
Lectures, Written Assignments, Presentations.					
Course Assessment:					
Mid Term Exams, Final Term Exams, Assignments, Quizzes, Presentations					
Reference Material:					

7. Introduction to computer theory, Daniel I. A. Cohen, 2nd Edition
8. Automata, Computability and Complexity: Theory and Applications, by Elaine Rich,
9. An Introduction to Formal Languages and Automata, by Peter Linz, 4th edition, Jones & Bartlett Publishers, 2006
10. Theory Of Automata, Formal Language and Computation, by S. P. Eugene, Xavier, 2005, New Age Publishers