NCEAC.FORM.0

COURSE OUTLINE

INSTITUTION University of Management & Technology, Lahore

BS Computer Science

PROGRAM (S) TO BE EVALUATED

Course Description

Course Code	CS-3043
Course Title	Theory of Automata
Credit Hours	3
Prerequisites by Course(s) and Topics	
Assessment Instruments with Weights (homework, quizzes, midterms, final, programming assignments, lab work, etc.)	Assignments 10 % Quiz's 10 % Class Activities 5% Mid Term 35 % Final Term 40 %
Course Moderator	Adeel Ashraf
URL (if any)	
Current Catalog Description	
Textbook (or **Laboratory Manual** for Laboratory Courses)	Introduction to Computer Theory 2nd Edition by Danial I. A. Cohen

Reference Material	Theory of Computation by Michael Sisper 2nd Edition
Course Goals	The goal of the course is to familiarize the students with the concept of formal languages, different classes of formal languages such as regular languages, contextfree languages, context-sensitive languages, and recursive and recursively enumerable languages. Students will also get knowledge about the grammar and machines used for describing various types of languages. These include regular expressions, finite state automata, context-free grammars, push-down automata, and Turing machines. The properties of different types of languages will also be discussed.

Course Learning Outcomes (CLOs):

	CLOs	Description	Domain & BT Level *
	CLO 1	**Describe** the role of abstract computational models to define which computational problems are solvable and which are not.	Cognitive, Two(C2)
	CLO 2	**Illustrate** the concepts of Language, Grammar, and Automata for Regular Languages, as well as their applications in computing systems.	Cognitive, Two(C3)
	CLO 3	**Illustrate** the concepts of Language, Grammar, and Automata for Context-Free Language, as well as their applications in computing systems.	Cognitive, Three(C3)
	CLO 4	**Understand** the Turing machines and their applications in computing systems.	Cognitive, Two(C2)
* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain			

Mapping of CLOs to Program Learning Outcomes (PLOs):

CLOs/PLOs	CLO 1	CLO 2	CLO 3	CLO 4
PLO 1: Academic Education	✓			
PLO 2: Knowledge for Solving Computing Problems		✓	✓	✓
PLO 3: Problem Analysis				
PLO 4: Design and Development of Solutions				
PLO 5: Modern Tool Usage				
PLO 6: Individual and Teamwork				
PLO 7: Communication				
PLO 8: Computing Professionalism and Society				
PLO 9: Ethics				
PLO 10: Life-Long Learning				

Topics Covered in the Course, with Number of Lectures on Each Topic				
	Week	**Topics**	**Assessments**	**CLOs**
	1	Introduction to Automata Theory Finite Automata		
	2	Deterministic Finite Automata (DFA).		CLO1
	3	Non-Deterministic Finite Automata (NDFA)	Quiz#1	CLO1
	4	Minimization of DFA Regular Expressions		
	5	Operations on Regular expressions Finite Automata and Regular Expressions.	Assignment -1	CLO2
	6	TG and GTG Equivalence of Deterministic and Nondeterministic Finite Automata		CLO2
	7	Kleene's Theorem	Quiz-2	

		8	Pumping Lemma for Regular Languages. Closure Properties of Regular Languages			
		9	Revision and Midterm	Mid Term	CLO1, CLO2,	
		10	Mealy Moore Machines. Conversion from Mealy to Moore and vice versa.		CLO3	
		11	Context-Free Grammars; Regular Grammars; Parse Trees	Assignment -2		
		12	Ambiguity in Grammars and Languages. Standard Forms; Chomsky Normal Forms;	Quiz-3	CLO3	
		13	Deterministic and NonDeterministic (PDA); Formal definition of NPDA. Transition functions of NPDA; NPDA Execution; Accepting Strings with NPDA; Equivalence of PDAs and CFG.		CLO4	
		14	Turing machines and decidability			
		15	Complexity issues and analysis P and NP problems		CLO4	
Laboratory Projects/Experiments Done in the Course						
Programming Assignments Done in the Course		1 programming assignments				
		3 hours per week				

Class Time Spent on (in credit hours)				
Oral and Written Communications				

Lecture Plan

CLOs	Quiz #1	Quiz #1	Quiz #2 Assignment #1	Quiz #3 Assignment #1	Midterm Exam	Final Term
1	✔				✔	✔
2		✔			✔	✔
3			✔			✔
4				✔		✔

Instructor Name: Rana Marwat Hussain

Instructor Signature _____