INSTITUTION FAST - National University of Computers and Emerging Sciences

PROGRAM (S) TO BE EVALUATED BS - Computer Science

A. Course Description

(Fill out the following table for each course in your computer science curriculum. A filled out form should not be more than 2-3 pages.)

Course Title	Theory of Computation / Automata		
Course Code	CS3005	**Credit Hours**	3 + 0
Prerequisites by Course(s)	Discrete Structures	**Semester**	Spring 2021
Assessment Instruments (with tentative weights)	**Semester Work 20%** (at least 5 assignments) **Midterm 30%** (2 Mid semester exam – Week 6 and Week 12) **Final 50%** (Comprehensive end of semester exam)		
Course Coordinator	Musawar Ali		
Office Hours	08:00 am – 04:00pm.		
Current Catalog Description	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		
Textbook (or **Laboratory Manual** for Laboratory Courses)	1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation 2. P. Linz. Introduction to Formal Languages and Automata, 6th edition, 2017 (or 5th or 4th edition), Jones and Barlett 3. Daniel I. A. Cohen, Introduction to Computer Theory 4.		
Reference Material	1. John Martin, Introduction to Languages and the Theory of Computation, Third Edition 2. Michael Sipser, Introduction to Theory of Computation		
Course Goals	**A. Course Learning Outcomes (CLOs)**		

CLO No.	Course Learning Outcomes	Bloom Taxonomy	Tools
CLO-1	Explain and manipulate the different concepts in automata theory and formal languages such as formal proofs, automata, regular expressions,	C2 (Understand)	A1, Q1

PLO 12	Life Long Learning	Recognize the need for, and have the preparation and ability to independent and life-long learning in the broadest context of technological changes.

	1	2	3	4	5	6	7	8	9	10
	✔	✔	✔	✔						
	✔	✔	✔							
CLOs	✔		✔							
	✔		✔	✔						
	✔	✔	✔	✔						
6	✔		✔							

Week #	Lecture #	Topics	CLO	Chapters
1.	**1.**	Discussion on Course Outline, Introduction to Finite Automata	CLO-1	[HMU]:1.1 [Linz]: 1
	2.	What does automata means? Introduction to Languages, Alphabets, Strings	CLO-1	[HMU]: 1.5 [DC]: 1
	3.	Kleene Star Closure, Regular Expression (RE)	CLO-3	[DC]: 4 [HMU]: 3 [JM]: 3 [Linz]: 3
2.	**1.**	Equivalent RE, Finite Automaton (FAs), Equivalent FAs	CLO-3	[HMU]: 2 [JM]: 2 [MS]: 1
	2.	FA corresponding to finite languages, Transition Graph	CLO-3	[Linz]: 2.1 [DC]: 6
	3.	Continued		
3.	**1.**	Examples of TGs: accepting all strings, accepting none, starting with b, not ending in b, containing aa, containing aa or bb.	CLO-4	[Linz]: 2 [DC]: 6
	2.	Generalized Transition Graph	CLO-4	[DC]: 6
	3.	Language accepted by NFA, Recursive definition of NFA	CLO-4	[Linz]: 2.2 [HMU]:2.3
4.	**1.**	Basis Clause and Inductive Clause of NFA	CLO-4	[Instructor Notes]
	2.	NFA with Λ Transitions, Language accepted by NFA- Λ,	CLO-4	[Instructor Notes]

	16. **1.** **Final Exam**

Class Time Spent on (in credit hours)	**Theory**	**Problem Analysis**	**Solution Design**	**Social and Ethical Issues**
	15	15	15	0

Oral and Written Communications	Every student is required to submit at least ___5__ written assignments of typically __3-4_ pages at least and to make no oral presentations.
Academic Integrity Zero tolerance on cheating as per FAST Policies. All Cases (in any Assessment Instruments) will be referred to department committee.	Plagiarism is strictly prohibited and would be strictly dealt with. Late submission of assignment will be allowed until its solution is discussed. It is better to partially attempt what you understand and submit remaining as late, than to copy from someone else or internet. - Max Grade penalty of 50% (in assignment) for late submit. - Min Grade penalty of 100% (in course) for plagiarism. **When taking help in your assignments (from web)** - Cite reference clearly, mentioning URL and content taken. - Even if referred, it is still plagiarism to use the same sentence or change it in active/passive form. Use your own words, ALWAYS!. **When taking help in your assignments (from peers)** - Discussing assignments with peers is allowed only on discussion group. Do not provide excuses later. - Provide help in form of explaining problem rather than explaining solution. Group discussion is encouraged.

Evaluation Policy For FAST Policies please read the student handbook.	- Attendance and Quizzes will be held in start of class. - Exams may be open book (closed notes). Please do NOT write or mark anything on the book. - There will be NO compensation for missed quiz. - All graded evaluations will be property of the instructor. - Take classes only with your section, assigned by FAST CS dept. **- IMPORTANT**: Always send me same day EMAIL reminder if I give you any verbal comment e.g class participation bonus, late submission allowed, leave allowed, average marks etc.