NATIONAL UNIVERSITY
of Computer & Emerging Sciences, Lahore

Department of Computer Science

CS301 – Theory of Automata

FALL 2018

Instructor Name: Noshaba, Nasir
Email address: noshaba.nasir@nu.edu.pk
Office Location/Number: M107, Opposite Lab 4
Office Hours: TBA

TA Name (if any): -
Email address: -
Office Location/Number: -
Office Hours: -

Course Information

Program: BS **Credit Hours:** 3 **Type:** Core
Pre-requisites: CS211 Discrete Structures
Course Website: https://sites.google.com/view/cs301-toa-fall2018
Class Meeting Time: Section C: M, W 1230 – 1400, Section D: T ,T 0930-1100, Section E: M, W 1400 – 1530
Class Venue: Section C & E: CS-06 Section D: CS-08

Course Description/Objectives/Goals:

Course Learning Outcomes (CLOs):		
At the end of the course students will be able to:	**Domain**	**BT Level**
Explain and manipulate the different concepts in automata theory and formal languages such as formal proofs, automata, regular expressions, Turing machines etc;		
Prove properties of languages, grammars and automata with rigorously formal mathematical methods		
Design of automata, RE and CFG		
Transform between equivalent NFAs, DFAs and REs		
Define Turing machines performing simple tasks.		
Differentiate and manipulate formal descriptions of languages, automata and grammars with focus on regular and context-free languages, finite automata and regular expressions		

Course Textbook

1. John C. Martin. *Introduction to Languages and the Theory of Computation*. Fourth Edition. 2003. McGraw-Hill. ISBN: 0-07-115468-X (International Students Edition).

Additional references and books related to the course:

1. John E. Hopcroft. Jeffery D. Ullman. *Introduction to Automata Theory, Languages, and Computation*. 1979. Addison-Wesley. ISBN 0-201-02988
2. Michael Sipser. *Introduction to the Theory of Computation.* 1997. PWS Publishing Company.
3. T.A. Sudkamp: Languages and Machines (Addison-Wesley, 2nd Edition, 1997)
4. Harry R. Lewis, Christos H. Papadimitriou *Elements of The Theory of Computation*. Second Edition. 1998.
5. Daniel I. A. Cohen. *Introduction to Computer Theory*. Second Edition. 1997. John Wiley & Sons. ISBN: 0-471-13772-3.

Tentative Weekly Schedule

Week	Topics to be covered	Readings	Assignments/ Projects
1	• Introduction • Language Definition Preliminaries		
2	• Regular Languages (Focus of DFA)		Assignment 1
3	• NFA, NFA null		
4	• Closure Properties of FA • Regular Expressions • Kleene Theorem Part 1		
5	• Kleene Theorem part 2 • Minimal DFA		
6	• Pumping lemma of Non RL • Intro to CFL		
7	• PDA, (deterministic and non-deterministic)		Assignment 2

8	• CNF • CYK parser		
9	• LL(1) grammar • Top down parser		
10	• Closure Properties of CFG • Pumping lemma for CFG		
11	• Turing Machines		Assignment 3
12	• Turing Machines		
13	• Turing Machines • Decidability		
14	• Context sensitive languages • Linear bounded automate		

(Tentative) Grading Criteria

1. Assignments + Quizzes 20%
2. Mid-I + Mid II 35%
3. Final 45%

Course Policies

1. Cheating in any respect will be treated as a big crime and your cases will be forwarded to DC.
2. Eligibility to pass this course, students should have to get at least 50% marks and 80% attendance.
3. Hand written assignments should be submitted in due time. 25% marks will be deducted per day after due date.
4. Attendance will be marked at the start of class, late comer will be marked LATE.
5. Quizzes can be unannounced, covering contents of last two lectures.