UNIVERSITY OF AGRICULTURE, FAISALABAD

Department of Computer Science

Course Outline (Major Course for M.Sc(Computer Science))

Program	**BS Computer Science**	**Course Instructor**	Wajeeha Azmat Dept. of Computer Science, University of Agriculture, Faisalabad.
Years/Semester	Winter 2022-23	**E-Mail**	Wajeeha.azmat@yahoo.com
Title of the Course	Theory of Automata		
Course No	CS-605		
Credit Hours	3(2-1)		
Prerequisites	Basic knowledge of Discrete structures		
Follow Up	Advance courses of computation		
Category	Major course		
Aims	To understand the computation of languages and their models		
Objectives	➢ The course provide formal models for the computation of functions and for the recognition and generation of languages.		
Syllabus	Introduction to Automata Theory, Syntactic Languages and Sematic Languages, Language of Palindromes, Descriptive Definition for languages, Recursive Definition and Regular Expression. Deterministic Finite Automata and Non-deterministic Finite Automata. Transition Graph and Generalized Transition Graph. Machines with output: Moore and Mealy machines. Context Free Grammar, Chomsky Normal Form, Regular Grammar. Push Down Automata. Pumping Lemma, Maze problem.		
Suggested Readings	1. Introduction to Computer Theory by Daniel I.A.Cohen. 2. Automata, Computability and Complexity: Theory and Applications, By Rich, E., 2011. 3. Introduction to Languages and the Theory of Computation, Martin, J.C., 2005. 3rd Edition.		
Reference Material	➢ Internet ➢ Recommended books for the course		
Instructional Aids/Resources	➢ Power Point Multimedia ➢ White board/marker ➢ Photocopied materials		
Teaching Strategies	➢ Class Lectures ➢ Assignments		

<table>
<tr><td colspan="2"></td><td colspan="5">➢ Hybrid mode
➢ Class discussions
➢ Class Task
➢ Quiz tests
➢ Assignments</td></tr>
<tr><td rowspan="4">Assessment</td><td>Marks</td><td>Sessional</td><td>Mid</td><td>Final</td><td>Practical</td><td>Total</td></tr>
<tr><td>Criteria</td><td>Assignments</td><td>Paper</td><td>Paper</td><td>Paper</td><td></td></tr>
<tr><td>Theory</td><td>4</td><td>12</td><td>24</td><td>20</td><td>60 (100%)</td></tr>
<tr><td>Result</td><td></td><td colspan="3">Total: 60 Marks</td></tr>
<tr><td colspan="2">Recommendations</td><td colspan="5">The students at BS level should be asked to consult the recommended books and exercise manuals provided.</td></tr>
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Department of Computer Science

Name of Teacher: **Wajeeha Azmat**
Designation: Lecturer

LECTURE PLAN/TEACHING SCHEDULE: **Theory of Automata and Computation (CS-630)**

Week/ Lecture	**Topics to be covered**	**Book**	**Pages**
Week 1			
Lecture 1	Introduction to Automata Theory, Basic definitions of terms.	Book 1 (cohen)	
Lecture 2			
Week 2			
Lecture 1	Language building block.	Book 1 (cohen)	
Lecture 2	Syntactic Languages and Sematic Languages.		
Week 3			
Lecture 1	Alphabet Rules. Valid and Invalid alphabet sets. Strings, basic operation on strings.	Book 1 (cohen)	
Lecture 2			
Week 4			
Lecture 1	Defining the languages (syntactic languages. Descriptive Definition for defining languages	Book 1 (cohen)	
Lecture 2			
Week 5			
Lecture 1	Palindromes.	Book 1 (cohen)	
Lecture 2	Theorems of palindromes		
Week 6			
Lecture 1	Recursive Definition for languages.	Book 1 (cohen)	
Lecture 2			
Week 7			
Lecture 1	Regular Expression, Converting recursive definition into regular expression.	Book 1 (cohen) Book 2	
Lecture 2			
Week 8			
Lecture 1	Finite Automata Abstract Machines, Regular and Non-regular Languages.	Book 1 (cohen)	
Lecture 2			
Week 9			
Lecture 1	Transition Graph	Book 1 (cohen), **Book 2**	
	Mid Test		

Week 10			
Lecture 1	Generalized Transition Graph	Book 1 (cohen)	
Lecture 2	Machines with output, Moore Machine		
Week 11			
Lecture 1	Mealy Machines	Book 1 (cohen)	
Lecture 2	Equivalent Machines		
Week 12			
Lecture 1	Context Free Grammar, Construction of Regular grammar from Finite Automata and Transition Graph.	Book 1 (cohen)	
Lecture 2			
Week 13			
Lecture 1	Elimination of Null and Nullable productions	Book 1 (cohen)	
Lecture 2	Chomsky Normal Form		
Week 14			
Lecture 1	Push Down Automata. Conversion of FA to PDA	Book 1 (cohen) Book 2	
Lecture 2			
Week 15			
Lecture 1	Conversion of CFG to CNF.	Book 1 (cohen) Book 2	
Lecture 2	Conversion of CNF to PDA. PDA for non-regular languages		
Week 16			
Lecture 1	Turing Machines. Equivalent models, self-reference and incompleteness	Book 1 (cohen)	
Lecture 2			
Week 17			
Lecture 1	The Lambda Calculus, Parsing Techniques	Book 1 (cohen) Book 3	
Lecture 2			
Week 18			
Lecture 1	Pumping Lemma	Book 1 (cohen) Book 3	
Lecture 2			
Week 19	Final Examination and Results submission	------	