





University of Petra		
Faculty of Information Technology		كلية تكنولوجيا المعلومات
Department of Computer Science		قسم علم الحاسوب

### Course Syllabus

Year: 2017-2018

Semester: (1)

Course No.	Course Title	Prerequisite	Co-requisite	Credit Hours Lectures /Lab.
601322	Computation Theory	601221	-	3:3:0 Lab

Instructor Name	E-mail	Office No.	Office ext.	Office Hours

Coordinator's Name:	
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<b>Short Course Description</b>	This course introduces the basic concepts of computation theory. Topics covered: automata theory, deterministic and nondeterministic finite automata, regular expressions, regular languages and their properties, context-free grammars, context-free languages and their properties, pushdown automata, introduction to Turing machines, undesirability, and intractable problems.
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#### Course Objectives

- Use regular expressions effectively.
- Recognize problems that cannot be solve by regular expressions.
- Design FA, PDA, and TM efficiently.
- Constructing CFG and putting them in a normal form
- Design and create parsers and pattern recognition routines.
- Recognize feasible and intractable problems.
- Understand the equivalence of grammar, languages, and automata.

#### Course Intended Learning Outcomes (ILOs) and their Alignment with Program ILOs, Teaching and Learning Methods, and Assessment Methods:

Upon successful completion of this course, students are expected to achieve the following learning outcomes:



Course ILOs	Program ILOs	Teaching and Learning Method	Assessment Method
<b>Knowledge (K)</b>			
<b>K1.</b> Identify the language hierarchy, regular and context free grammars and different machines and their usage in different languages.	A.1	Interactive lectures	Final Exam
<b>Intellectual Skills (I)</b>			
<b>I1.</b> Construct different level of languages using (RE, FA, TG, CFG).	CS-J.1	Interactive lectures	Final Exam
<b>I2.</b> Construct PDA and TM for different languages.	CS-J.1	Interactive lectures	Final Exam
<b>I3.</b> Construct regular and context free grammars.	CS-J.1	Interactive lectures	Final Exam
<b>Practical skills (P)</b>			
<b>P1.</b> Implement and test FA and NDFA machine for regular languages.	C.2	Interactive lectures	Assignments

**Course Schedule:**

Week	Topic Details	Course ILO number	Reference
1	Introduction: basic concepts and languages Recursive definition and regular expression Regular expression	A.1	Ch1
2	Finite representation of Languages, REs, Language generation using REs.	CS J.1	Ch3
3	FA, DFA, example on DFA Transition graph	CS J.1	Ch2
4	Kleene's theorem and Non determinism NDFA, examples on NDFA, Differences of DFA and NDFA,	CS J.1	Ch3,4
5	Conversion of NDFA to its equivalent DFA, FA and RE, Algorithms for FA.	CS J.1	Ch2
6	Pumping theorem for Language that are and are not regular	CS J.1	Ch4
7-9	Context-Free grammar and regular grammar Ambiguity, converting CFG to Chomsky Normal Form (CNF).	CS J.1	Ch6,8
10-11	Push Down Automata PDA, NDPA, example on PDA	CS J.1	Ch7
12	<b>Parsing</b>	CS J.1	Ch5
13-15	Turing Machine, Example on Turing Machine. A notation for Turing Machine, Computation with Turing Machine. Turing-Acceptable, Turing-decidable, and Turing computable; Example of more powerful Turing Machines.	CS J.1	Ch9
16	<b>Final Exam</b>		

**Assessment Methods and Grading System:**

Assessment method	Grade	Comments
First Exam	20%	Covers topics introduced from week 1-5
Second Exam	20%	Covers topics introduced from week 6-10
Programming Assignments	20%	
Final Exam	40%	Covers all the topics introduced in the course
<b>Total</b>	<b>100</b>	

**Learning References:**

<b>1- Textbook (s):</b>
An Introduction to Formal Languages and Automata, Peter Linz, Fourth Edition, Jones and Bartlett Publishing 2006
<b>2- References:</b>
<ul style="list-style-type: none"><li>• Introduction to Automata Theory, Languages, and Computation, 3rd edition, John E. Hopcraft, R. Motwan Jeffrey D. Ullman, Pearson 2006</li><li>• <i>Languages and Machines: An Introduction to the Theory of Computer Science (3rd Edition)</i>, Sudkamp T A, Addison Wesley, 2005</li><li>• Element of the theory of computation, 2<sup>nd</sup> Ed., Lewis and Papadimitriou, Prentice Hall, 1998</li><li>• Introduction to Computer Theory, D.I. Cohen, 2<sup>nd</sup> edition, J. Wiley, 1997</li><li>• Introduction to Languages and Theory of Computation, Martin J C, 2<sup>nd</sup> ed, McGraw-Hill., 1996</li><li>• Lecturer's Notes</li></ul>
<b>3- Other Resources:</b>
<<Labs, computer resources, lecture rooms needed for the course>>

**Course Policies<sup>1</sup>**

- Attendance Policy: University regulations apply to attendance.
- Academic Honesty: Academic dishonesty is an unacceptable mode of conduct, and will not be tolerated in any form at University of Petra. All persons involved in academic dishonesty and plagiarism in any form will be disciplined in accordance with University rules and regulations.
- Make-up Exams: Only students with valid excuses are allowed to have make up exams. All excuses must be signed by the Faculty Dean. Student has the responsibility to arrange with his/her instructor for an exam date before the occurrence of the next regular exam.
- All assignment and class work must be submitted at the specified due date. No late work will be accepted.
- No make up for quizzes under any circumstance.

Approved by	Name	Date	Signature
Coordinator of Curriculum Committee	Dr. Shakir Al-Faraji	15-10-2017	
Faculty Dean/ Head of Department			



Petra University

Form Name: Course Syllabus

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<sup>1</sup> Additional information may be added in this section according to the nature of the course.