



COURSE SPECIFICATIONS (CS)

Course Specifications

Institution: Najran University	Date: August 2017
College/Department : College of Computer Science and Information Systems/ Computer Science Department	

A. Course Identification and General Information

1. Course title and code:	Theory of Computation	235CSS-3																				
2. Credit hours:	3(3,0,0)																					
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs)	Computer Science program																					
4. Name of faculty member responsible for the course	Ms. Eman Abdulkreem (Instructor) Dr. Assadullah (Coordinator)																					
5. Level/year at which this course is offered: Level 6 /3 rd year (including preparatory year for computer science).																						
6. Pre-requisites for this course (if any):	None																					
7. Co-requisites for this course (if any):	None																					
8. Location if not on main campus:	Main campus																					
9. Mode of Instruction (mark all that apply):	<table border="0"> <tr> <td>a. traditional classroom</td> <td><input type="checkbox"/></td> <td>What percentage?</td> <td><input type="checkbox"/></td> </tr> <tr> <td>b. blended (traditional and online)</td> <td><input checked="" type="checkbox"/></td> <td>What percentage?</td> <td>100%</td> </tr> <tr> <td>c. e-learning</td> <td><input type="checkbox"/></td> <td>What percentage?</td> <td><input type="checkbox"/></td> </tr> <tr> <td>d. correspondence</td> <td><input type="checkbox"/></td> <td>What percentage?</td> <td><input type="checkbox"/></td> </tr> <tr> <td>f. other</td> <td><input type="checkbox"/></td> <td>What percentage?</td> <td><input type="checkbox"/></td> </tr> </table>		a. traditional classroom	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>	b. blended (traditional and online)	<input checked="" type="checkbox"/>	What percentage?	100%	c. e-learning	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>	d. correspondence	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>	f. other	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>
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f. other	<input type="checkbox"/>	What percentage?	<input type="checkbox"/>																			
Comments:																						

B Objectives

1. What is the main purpose for this course?

- Describe the basic concepts of alphabets, strings, regular expressions, languages, derivation (leftmost and rightmost), finite state machines, pushdown automata, Turing machines, decidability, halting problems and time complexity.
- Explain the relationships between regular expressions, different types of languages defined by grammars and abstract machines.
- Construct finite automata, push down automata, Turing machines and regular expressions that models different types of languages.
- Design various models of computation.
- Assess the equivalence of DFA with NFA, PDA with context free grammars, and regular expressions with automata.

2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)

None

C. Course Description (Note: General description in the form used in Bulletin or handbook)

Course Description:

Introduction to languages, Alphabets and strings, concatenation, languages, operations on strings and languages, regular expressions and regular languages. Analysis of Finite-state Automata, regular expressions and equivalence with automata, Non-deterministic FA and their equivalence to deterministic FA, and Pumping Lemma, Push-down Automata and equivalence with context-free grammars. Introduction to Turing Machines and various models of TM's and their equivalence. Study of Context-Free Grammars and languages, transitions between grammars and machines, derivations and derivation trees. Simplification of context-free grammars and Chomsky normal form. Brief introduction to Decidability, Reducibility, Un-decidability, Time Complexity including the classes P and NP.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
1. Introduction to Finite Automata, Structural Representation, The Central concepts of Automata theory, Alphabets, Strings, Languages	1	3

2. Deterministic Finite Automata,	1	3
3. Non-deterministic Finite Automata	1	3
4. Equivalence of Deterministic and Non-deterministic Finite Automata.	1	4
5. Regular Expressions	1	4
6. Converting Regular Expressions to Automata	1	4
7. pumping lemma	1	4
8. Context-Free Grammars,	2	6
9. Pushdown Automaton	1	4
10. Normal Forms for CFGs	1	3
11. The Turing Machine	1	4
12. Linear Bounded Automata	٢	3
13. The Halting problems, The Classes P and NP, Polynomial Time Reductions, NP-Complete problems	1	3

2. Course components (total contact hours and credits per semester):							
		Lecture	Tutorial	Laboratory/ Studio	Practical	Other:	Total
Contact Hours	Planned	45	6	-	-	-	51
	Actual	45	6	-	-	-	51
Credit	Planned	3	0	-	-	-	3
	Actual	3	0	-	-	-	3

3. Additional private study/learning hours expected for students per week.	4
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4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy
<p>On the table below are the five NQF Learning Domains, numbered in the left column.</p> <p>First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). Second, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. Third, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and</p>

flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)			
Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	Knowledge		
1.1	Describe the basic concepts of alphabets, strings, regular expressions, languages, derivation (leftmost and rightmost), finite state machines, pushdown automata, Turing machines, decidability, halting problems and time complexity.	<ul style="list-style-type: none"> Lectures, active learning, collaborative and cooperative learning and independent study assignments. Using internet to search the information related to automata theory and summarizing the finding on internet search. 	Rubric based exams (Quiz and Midterm exams).
1.2	Explain the relationships between regular expressions, different types of languages defined by grammars and abstract machines.	<ul style="list-style-type: none"> Lectures, active learning, collaborative and cooperative learning. Using internet to search the information related to automata theory and summarizing the finding on internet search. Assigning computation related tasks that can be answered by reading the provided material and to analyze it. Group discussion in the class. Explanation and examples given in class lectures. Presenting, analyzing and solving different problems in class room. Giving correction of solved problems in tutorials 	Rubric based exams (Quiz, Midterm, and final exams).
2.0	Cognitive Skills		
2.1	Assess the equivalence of DFA with NFA, PDA with context free grammars, and regular expressions with automata.	<ul style="list-style-type: none"> Lectures, active learning, collaborative and cooperative learning. Assigning computation related tasks that can be answered by reading the provided material and to analyze it. Group discussion in the class. Explanation and examples given in class lectures. Presenting, analyzing and solving different problems in class room. 	Rubric based exams (Mid Term2,final exam)

		<ul style="list-style-type: none"> Giving correction of solved problems in tutorials. 	
2.2	Construct finite automata, push down automata, Turing machines and regular expressions that models different types of languages.	<ul style="list-style-type: none"> Lectures, active learning, collaborative and cooperative learning and independent study assignments. Group discussion in the class. Solving examples related to automata theory. Explanation and examples given in class lectures. Presenting, analyzing and solving different problems in class room. Let student present the answers of carefully chosen problems. <p>Giving correction of solved problems in tutorials</p>	Rubric based exams (Quiz 1,2, Mid Term1,final exam)
2.3	Design various models of computation.	<ul style="list-style-type: none"> Lectures, active learning, collaborative and cooperative learning and independent study assignments. Group discussion in the class. Solving examples related to automata theory. Explanation and examples given in class lectures. Presenting, analyzing and solving different problems in class room. Let student present the answers of carefully chosen problems. Giving correction of solved problems in tutorials 	Rubric based exams (Quiz 2, Mid Term2,final exam)
3.0	Interpersonal Skills & Responsibility		
3.1	Assess the equivalence of DFA with NFA, PDA with context free grammars, and regular expressions with automata.	<ul style="list-style-type: none"> Lectures, active learning, collaborative and cooperative learning. Assigning computation related tasks that can be answered by reading the provided material and to analyze it. Group discussion in the class. Explanation and examples given in class lectures. Presenting, analyzing and solving different problems in class room. Giving correction of solved problems in tutorials. 	Rubric based exams (Quiz 2, Mid Term2,final exam)
4.0	Communication, Information Technology, Numerical		

4.1	Construct finite automata, push down automata, Turing machines and regular expressions that models different types of languages.	<ul style="list-style-type: none"> Lectures, active learning, collaborative and cooperative learning and independent study assignments. Group discussion in the class. Solving examples related to automata theory. Explanation and examples given in class lectures. Presenting, analyzing and solving different problems in class room. Let student present the answers of carefully chosen problems. Giving correction of solved problems in tutorials 	Rubric based exams (Quiz and Midterm exams) and assignments.
4.2	Design various models of computation.	<ul style="list-style-type: none"> Lectures, active learning, collaborative and cooperative learning and independent study assignments. Group discussion in the class. Solving examples related to automata theory. Explanation and examples given in class lectures. Presenting, analyzing and solving different problems in class room. Let student present the answers of carefully chosen problems. Giving correction of solved problems in tutorials 	
5.0	Psychomotor		
5.1	N/A		
5.2			

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Theory Assignments 1 & 2	4 th & 8 th	6%
2	Quizzes 1& 2	3 ^{ed} & 7 th	10%
3	Midterm Examinations 1	6 th	15%
4	Midterm Examinations 2	11 th	15%
5	Oral presentation	13 th	4%
6	Final Theory exam	16 th	50%
7	Total		100%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)
 - Faculty member should set up to 10 hours weekly as office hours in their time tables.
 - Academic advisors are assigned to advise and support students.
 - Instructors set specific office hours for each course he is teaching. The teaching load of staff members are available in the front of their offices.
 - Instructors arrange and provide tutorials to students.

E Learning Resources

1. List Required Textbooks
J.E. Hopcroft, R. Motwani, J.D: Ullman, Introduction to Automata theory, Languages, and Computation (3rd Edition), Addison Wesley, 2007.
2. List Essential References Materials (Journals, Reports, etc.)
 - Michael Sipser, Introduction to the Theory of Computation (Second Edition), Thomas Course Technology, 2005.
 - John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education, (2000)
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) <ul style="list-style-type: none"> Lecture Rooms with 30 seats with a multimedia projector. white board, personal computer, one table .
2. Technology resources (AV, data show, Smart Board, software, etc.) <ul style="list-style-type: none"> Desktop/ Laptop computer Projector system
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) N/A

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching <ul style="list-style-type: none"> Online course survey: By the end of each semester, students give their opinions about many factors in the course. They give feedback about the teaching strategies, assessment methods, textbooks, instructor, etc. Feedback about Course Learning Outcomes (CLOs): A course survey is distributed to students to take their opinions about the CLOs
2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department <ul style="list-style-type: none"> Meeting with course coordinator and college coordinator periodically. Independent assessment of standard achieved by students.
3. Processes for Improvement of Teaching <ul style="list-style-type: none"> Note down the problem that face during class and try to solve those problems by discussing senior faculty members Learning best teaching methods from the best teacher amongst all faculty members Workshops to facilitate the exchange of experiences amongst faculty members Implement the improvement plan of previous semester. Encourage students to attend tutorials and to benefit from office hours.

4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)

- Course coordinator reviews all exams and makes sure that they are related to CLOs and appropriate for the course.
- A list of staff members has to check the grades of each one of the students in all exams.

5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- Each instructor has to teach the course according to the previous course materials and improvement plans
- By the end of each semester, a course file containing all activities and samples must be prepared and submitted to the college.
- Evaluation of CLOs can be used to compare the improvement from the previous evaluation.
- Improvement plan based on the online course survey must be prepared.
- Action plan based on the CLOs achievements must be prepared.

Name of Course Instructor: **Eman Abdelkreem**

Signature: _____  _____ Date Specification Completed: _August 2017

Program Coordinator: **Dr. Abdulrahman Thaqfan**

Signature: _____  _____ Date Received: _____