The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus

1.	Course title	Theory of Computation
2.	Course number	1901241
3.	Credit hours (theory, practical)	3
	Contact hours (theory, practical)	3
4.	Prerequisites/corequisites	Discrete Mathematics (1901101)
5.	Program title	Computer Science
6.	Year of study and semester (s)	Second year (Fall, Spring, Summer)
7.	Final Qualification	Bachelor degree
8.	Other department (s) involved in teaching the course	N/A
9.	Language of Instruction	English
10.	Date of production/revision	February, 2018
11.	Required/ Elective	Required

12. Course Coordinator:

13. Other instructors:

N/A

14. Course Description:

Sets, Relations, Closure and Languages, Finite Automata, deterministic and nondeterministic, Closure and pumping lemma, Regular languages and expressions, Context-Free Grammar, Regular languages and Context-Free languages, pushdown automata, closure, determinism and parsing, LL(1) Grammar, Turing machines and machine schemas, examples, Introduction to P and NP classes.

15. Course aims and outcomes:

A- Aims:

The main goal of Theory of Computation is to give an introduction to abstract languages and to theoretical computer science. The main objectives are:
1. *Understanding the main concepts of the theory of computation.*
2. *Representing languages using different types of grammars and automata,*

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to …

A- Knowledge and Understanding: Students should

A1) Learn how to use mathematical models in theoretical computer science.

A2) Know the importance of theory of computation (theoretical computer science) in the development and its influence on the rest discipline of computer science and engineering

A3) Learn and understand the concepts of theory of computation and complexity theory

B- Intellectual skills: with the ability to …

B1) Compare and analyze different types of automata and grammars

B2) Apply different mathematical methods to automata and grammars

C- Subject specific skills – with ability to …

C1) Design automata, grammar, or an expression for representing a specific language.

D- Transferable skills – with ability to

D1) Discuss and work in a group in order to specify languages and compare models

D2) Use tools to specify languages

16. Topic Outline and Schedule:

Topic	Week	ILOs	ABET SOs	TLA (teaching, learning and Assessment)
1. Introduction to theory of computation • Alphabets, words, languages. Operations over alphabets, sentences,	**1**	A1,A2	a	T: Lecture L: Reading CH 1 A: Midterm

Concatenation, closure				
2-Finite automata • Deterministic finite automata DFA • DFA (Formal Representation, Examples and Applications) • DFA (Intersection, Union, Complement) • Minimizing FA	**2**	A1,A2, B2,C1	a,b,i	T: Lecture and discussion L: Reading CH 2 A: Quiz or Assignment, Midterm, Final
2-Finite automata • Non-deterministic finite automata NFA (Definition and Examples) • NFA (Formal Representation and Tracing) • NFA (Concatenation, Union, Closure) • Equivalence of DFA and NFA	**3**	A1,A2, B1,B2, C1	a,b,i	T: Lecture and discussion L: Reading CH 2 A: Quiz or Assignment, Midterm, Final
3-Regular languages RL • Regular expression RE • RE (Examples, Union, Concatenation) • Connection between RE and RL • Regular Grammars (Definition) • Regular Grammars (Examples)	**4**	A1, A2, B1,C1	a,b,i	T: Lecture and discussion L: Reading CH 3 A: Quiz or Assignment, Midterm, Final
4. Properties of Regular languages • Closure properties of RL • Elementary questions about RL • Identifying non RL.	**5**	A1, A2, A3,B1, C1	a,b	T: Lecture and discussion L: Reading CH 4 A: Quiz or Assignment, Midterm, Final
Midterm	**6**			
5.Context-Free Languages CFL • Context-free grammars CFG • CFG (Examples) • Parsing and Ambiguity, CFG and programming languages	**7,8**	A1,A2, B2,C1	a,b,i	T: Lecture and discussion L: Reading CH 5 A: Quiz or Assignment, Final

6. Simplification of context free grammars • Chomsky Normal Form and • Creibach Normal Form	**9**	A1, A2, B1,B2	a,b	T: Lecture and discussion L: Reading CH 6 A: Quiz or Assignment, Final
7. Pushdown Automata • Nondeterministic Pushdown automata • NFA (Examples) • Pushdown automata and context free languages	**10**	A1,A2, B1,C1	a,b,i	T: Lecture and discussion L: Reading CH 7 A: Quiz or Assignment, Final
8. Properties of Context-Free languages • Pumping lemma for CFL Closure Properties for CFL	**11**	A1, A2, A3,B1, B2,C1	a,b	T: Lecture and discussion L: Reading CH 8 A: Quiz or Assignment, Final
9. Turing Machines • The standard Turing Machines • TM (Examples) • Other Models of Turing machine • A hierarchy of formal languages and automata	**12,13,**	A1, A2, A3, B2,C1	a,b	T: Lecture and discussion L: Reading CH 9, 10, 11 A: Quiz or Assignment, Final
10. Complexity • Complexity classes P and NP	**14**	A1, A2, A3	a,b	T: Lecture and discussion L: Reading CH 14 A: Quiz or Assignment, Final
Review	**15**			
Final Exam	**16**			

17. Evaluation Methods and Course Requirements (Optional):

Opportunities to demonstrate achievement of the ILOs are provided through the following <u>assessment methods and requirements</u>:

There will be several assessment methods of evaluation the performance of the students such as, grading the quizzes; conducting the Midterm and the Final Exams

18. Course Policies:

A- Attendance policies:
Deliberate abstention from attending 1901241 classes and any other similar acts will lead to student deprivation from the course according to the UJ regulations

B- Absences from exams and handing in assignments on time:
If you miss the midterm, then a makeup exam will not be provided unless you submit a valid absence excuse, within three days from the midterm, to your lecturer. This excuse must be signed and stamped from the UJ hospital in order to be valid. If your lecturer accepts the excuse then you will be able to take the midterm makeup. You need to follow up the departmental announcements regarding the makeup date and time. Please note that the lecturer may either accept or reject your excuse based on UJ regulations

C- Health and safety procedures:
N/A

D- Honesty policy regarding cheating, plagiarism, misbehavior:
All students in this course must read the University policies on plagiarism and academic honesty
http://registration.ju.edu.jo/RegRegulations/Forms/All_Regulations.aspx

E- Grading policy + Weighting (i.e. weight assigned to exams as well as other student work)
Midterm Exam: 30%
Quizzes, assignments and/or class participation: 30%
Final Exam: 40%

F- Available university services that support achievement in the course:
N/A

G- Statement on Students with disabilities

Students with Disabilities: *Students with disabilities who need special accommodations for this class are encouraged to meet with the instructor and/or their academic advisor as soon as possible. In order to receive accommodations for academic work in this course, students must inform the course instructor and/or their academic advisor, preferably in a written format, about their needs no later than the 4th week of classes.*

19. Required equipment:

N/A

20. References:

A-   Required book (s), assigned reading and audio-visuals:

An Introduction to Formal Languages and Automata, Peter Linz, Jones & Bartlett Learning, 6thEdition, 2016

B-   Recommended books, materials, and media:

1- Introduction to the theory of computation, Michael Sipser, Thomson, 3rd edition,
2- Elements of the theory of computation, H.R Lewis and C.H Papadimitriou, Prentice Hall, 2nd Edition

21. Additional information:

Course website:
elearning.ju.edu.jo

Date:

Name of Course Coordinator: Signature: ------------------------

Head of curriculum committee/Department: ------------------------ Signature: ---------------

Head of Department: ------------------------ Signature: --------------------------------

Head of curriculum committee/Faculty: ----------------------- Signature: ---------------------

Dean: --- -Signature: --------------------------------

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