UNIVERSITY OF BAHRAIN
College of Information Technology
Quality Assurance Office

جامعة البحرين
كلية تقنية المعلومات
مكتب ضبط الجودة

Course Information Form (*QAO-1*)

Code	ITCS312	Title	Automata and Formal Languages	Credit Hours	3-2-3
Pre/co-requisites	ITCS251	Web Page	http://heshaaam.wordpress.com		

Course Instructor	Email	Office Hours	Course Coordinator
Hesham Al-Ammal	hesham at itc dot uob dot bh	UTH 11am & T 8am S40-2076 Phone: 1743-7649	Dr. Hesham Al-Ammal

Course Description

Introduces the concept of abstract machines and basic concepts in the foundations to computer science. Formal languages and their relation to automata; the Chomsky hierarchy of classes of grammars; normal forms, recognition of languages; finite state automata; finite transducers; push down transducers; Turing machines; conversion algorithms and decidability problems.

Learning Outcomes

On successful completion of this course, students will be able to:

1. Discuss the concept of finite state machines and regular languages.
2. Identify and create context-free grammars and languages.
3. Design a deterministic finite-state machine to accept a specified language.
4. Provide examples of real world applications of automata and formal languages.
5. Determine a language's level in the Chomsky hierarchy (regular sets, context-free, context-sensitive, and recursively enumerable languages).
6. Convert among equivalently powerful notations for a language, including among DFAs, NFAs, and regular expressions, and between PDAs and CFGs.
7. Implement at least one algorithm for top-down or bottom-up parsing.
8. Explain the Church-Turing thesis and its significance.

- Define the classes P and NP.

Textbook

Peter Linz, *An Introduction to Formal Languages and Automata*, 5th Edition, Jones and Bartlett, 2006

Course Assessments

Mid-Term Exams	Lab Assignments	Quizzes	Project	Final Exam
40%	10%	10%	-	40%

Test Dates

Mid-Term Exams	Final Exam
Midterm 1: Wed. 29/10 at 11:30am Midterm 2: Wed. 24/12 at 11:30am	Date: Sunday 18 -January-2007. Time: 8:30-10:30

General Notes

- Exam dates are final. No makeup exams.
- Test points will be carried forward to the final exam for students with valid approved absence reasons.
- Lab assignments can be submitted by teams of at most two students.

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Course Weekly Breakdown (*QAO-2a*)

Week	Date	Topics to be Covered	Notes	Lab. Assignments
1	15/9 17/9	1.1: Introduction 1.2: Languages, grammars and Automata 1.3: Some applications		
2	22/9 24/9	2.1-2.2: Finite automata: DFAs and NFAs 2.3: Equivalence of DFAs and NFAs		Lab1: Introduction to JFLAP
3	29/9 1/10	3.1- 3.2: Regular expressions Eid al-Fitr Holiday		
4	6/10 8/10	3.3: Regular grammars		Lab2: Regular Expressions in Ruby
5	13/10 15/10	4.1-4.2: Properties of regular grammars		
6	20/10 22/10	4.3: Identifying non-regular languages 5.1: Context-free grammars		
7	27/10 29/10	5.2: Parsing and ambiguity 6.1: Methods of transforming grammars	**Midterm 1**: Wed. 29/10 at 11:30am	
8	3/11 5/11	6.2: Chomsky normal form		Lab3: Parsing and programming languages part 1
9	10/11-12/11	Mid-semester break for students		
10	17/11 19/11	7.1: Pushdown automata 7.2: Pushdown automata	20/11 Last day for withdrawal with W	
11	24/11 26/11	9.1-9.2: The standard Turing machine		Lab4: Simulation of a Turing machine
12	1/12 3/12	9.3: Turing's thesis		
13	8/12 10/12	Eid al-Adha holiday		Lab5: Parsing and programming languages part 2
14	15/12 17/12	11.1: A Hierarchy of formal languages		
15	22/12 24/12	12.1 Limits of Algorithmic Computation Computability, PCP, and undecidability	**Midterm 2**: Wed. 24/12 at 11:30am	
16	29/12 31/12	Hijri new year Review		
17	5/1	Last day of classes		