



Formal Languages and Automata Course Specifications

Faculty: Computer and Informatics

Department: Information System

Program(s) on which the course is given: Bachelor in Computer and Information Sciences

Major or Minor element of programs : All majors

Department offering the program : Information System

Department offering the course : Computer Science

Academic year / Level : 3rd year / B Sc

Date of specification approval : 4/10/2009

A- Basic Information

Title: Formal Languages and Automata

Code: CSC 341

Lectures: 3 hrs/week

Practical: ---

Tutorial: 2 hrs/week

Credit Hours: ---

Total: 5 hrs/week



B- Professional Information

1. Overall Aims of Course:

The aims of the course are:

- 1.To give an understanding of the basic theory formal languages and automata.
- 2.To introduce the types of formal grammars.
- 3.To study the relations between automata, languages and grammars.
- 4.To give some applications to compilers.

2. Intended Learning Outcomes of Course (ILOs):

a. Knowledge and Understanding

- a1- List the basic models of computation such as DFA, NFA, PDA and TM.
- a2- Understand the languages recognized by those models of computation.
- a3- Understand the concepts of Automata, and Formal Languages.
- a4- Understand the relationships between the grammars and abstract machines and Expressions.
- a5- Understand the properties and theorems on languages.
- a6- Identify and follow basic mathematical arguments couched in terms of abstract models.



b. Intellectual Skills

- b1- Determine the type of a formal language by using the grammar tools.
- b2- Use regular expressions to analyze regular languages.
- b3- Use context free grammar to analyze context free languages .
- b4- Analyze whether a language is or isn't regular or context-free .
- b5- Construct simple parsers (Top down and Bottom up)and prove the grammar is ambiguous or not.

c. Professional and Practical Skills:

- c1- Inject abstract concepts .

d. General and Transferable Skills:

- d1- Presenting any real life problem as state machine which are useful in determining whether the given problem can be solved on computer or not.

e. Attitude:

- e1. A knowledge and respect of ethics and ethical standards in relation to a major area of study.
- e2. Relationship Emphasis a successful with other students.
- e3. Learn how to make relation with other, and the limit of this relation.



كلية الحاسبات و المعلومات



3. Contents:

| Topic | No. of hours | Lecture | Tutorial/ Practical |
|--|---------------------|----------------|--------------------------------|
| Alphabets , languages , grammars | 5 | 3 | 2 |
| Regular expressions and regular languages | 5 | 3 | 2 |
| Finite state automata (DFA , NFA) | 5 | 3 | 2 |
| Transforming NFA into DFA | 5 | 3 | 2 |
| Regular expressions and NFA | 5 | 3 | 2 |
| Regular grammars and NFA | 5 | 3 | 2 |
| Minimum state DFA , Kleene Theorem | 5 | 3 | 2 |
| Non –regular languages , the pumping lemma | 5 | 3 | 2 |
| Homomorphisms of Languages FA with output ,Applications | 5 | 3 | 2 |
| CF-LANGUAGES and CF- grammars | 5 | 3 | 2 |
| Pushdown automata PDA | 5 | 3 | 2 |
| CF-GRAMMARS and PDA | 5 | 3 | 2 |
| Non-CF-LANGUAGES | 5 | 3 | 2 |
| The Turing Machine Model TM | 5 | 3 | 2 |