Salahadden University / Hawler
College of Science
Computer Department

COURSE BOOK

Computation Theory

Science College\Computer Science
Under Graduated Study

Second Stage

Academic Year

2015/2016

Lecturer

Dr.shaimaa Awad Baha_al Deen

Ph.D in Computer Science
Email:

Office hours: Monday 10:30-12:30 , or by appointment
Class hours: Tuesday 10:30-2:30

Course Description

This graduate level course is more extensive and theoretical treatment of the material in Computability, and Complexity. Topics include formal languages and its operations, some of sequential machines and showing the relationship between automata and various classes of languages. The course also covers Chomsky's grammar hierarchal.

Course Objective

The goal of this course is to provide students with an understanding of basic concepts in the theory of computation. At the end of this course students should:

- Understand what meaning by formal languages and the operations on it.
- Devise regular expressions and its transition graphs for formal languages.
- Understand the difference between deterministic and non-deterministic finite state automata.
- Design deterministic and non-deterministic finite state automata for language recognition and translation.
- Design push-down automata for language recognition and translation.
- Understand the essence of Chomsky's hierarchal and the differences between types of grammars.
- Be able to construct grammars for languages or extract the language from the grammar.
- Understand the operations on grammars.

Students will learn about a variety of issues in the mathematical development of computer science theory, particularly finite representations for languages and machines, as well as gain a more formal understanding of algorithms and procedures. They will have improved reasoning and problem-solving skills.

Grading

The grade will be based upon the following criteria

Two closed book exams (theoretical) ------------------- 40%

Final exam (theoretical)   -------------------------------------60%

References

1. **Introduction to Computer Theory/ Cohen**

2. **Algorithms for Compiler Design / O.G. Kakde**

Course Program

Week1:
Introduction and Course outline.

Week2 & 3:
Definition of
- sets,
- strings,
- language,

Representing a languages by set and the operation on it.

Week4 & 5:
Formal languages
Definition of regular expression, it includes the representation of formal language by using regular expression,
and the transition graph of regular expression.

Week6 & 7:
Deterministic and Nondeterministic Finite State Machine As Acceptor and Convert Nondeterministic to Deterministic Finite State.

Week8:
Finite State Machine As Translator.

Week9, 10 & 11:
Push Down Machine As
- Acceptor
- Translator

Week12, 13 & 14:

    Formal Definition of Grammar,
    How to construct grammar for a language,
    How to extract a language that generated by a specified grammar,
    Types of grammars,
    Type 0 (UG),
    Type 1 (CSG),
    Type 2 (CFG),
    Type 3 (RG),
    Convert LLG to RLG

Week15:

    Operations on grammars.

Final Exam: will be determined by the exam board.