Al Imam Mohammad ibn Saud Islamic University
College of Computer and Information Sciences

CCIS

Computer Science Department

Course Syllabus
CS412 - Formal Languages and Automata Theory

Catalog Description: Regular sets: finite automata, regular expressions, equivalences among notations, methods of proving a language not to be regular. Context free languages: grammars, pushdown automata, normal forms for grammars, proving languages non-context free. Turing machines: equivalent forms, undecidability. Closure properties, pumping lemmas, and decision algorithms. Introduction to computability.

Credit Hours: **3 Credit hours:** **3** Lectures per week **0** Labs. per week **0** Recitation per week

Prerequisites: CS344

Course Learning Outcomes:
1. Deal with regular and context-free languages; construct, understand and apply their formal descriptions.
2. Describe relations between languages and language classes.
3. Apply basic parsing methods.
4. Explain the difference between decidable and undecidable problems.

Major Topics:
- Automata, computability and complexity
- Mathematical Notions and Terminology
- Regular Languages
- Context-Free Languages
- Turing Machines
- Decidability
- Reducibility
- Recursion Theorem
- Decidability of logical Theories
- Time Complexity
- Space Complexity
- Intractability
- Approximation Algorithms
- Probabilistic Algorithms
- Alternation and proof systems

Text Books:
· Required: Introduction to the Theory of Computation, Sipser, 2nd edition, Course Technology, 2005.
· Optional: Languages and Machines: An Introduction to the Theory of Computer Science, Sudkamp, 3rd edition, Addison Wesley, 2005.
· Optional: Theory of Automata and Formal Languages, Sharma, 2nd edition, Firewall Media, 2006.
· Optional: Theory of Finite Automata: With an Introduction to Formal Languages, Carroll and Long, Prentice Hall, 1989.

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· Optional: Formal Languages and Automata Theory, Drobot, Computer Science Press, 1989.
· Optional: Introduction to Automata Theory, Languages, And Computation, Hopcroft, Motwani, and Ullman, 3rd edition, Addison-Wesley, 2006.
· Optional: An Introduction

Grading:

◎ The grading scale for this course is:
. 95 - 100 A+   Passing
. 90 - 94   A   Passing
. 85 - 89   B+   Passing
. 80 - 84   B   Passing
. 75 - 79   C+   Passing
. 70 - 74   C   Passing
. 65 - 69   D+   Passing
. 60 - 64   D   Passing
. 0   - 59   F   Failing

◎ Final grades will be determined based on the following components:
. 60% Semester Work
. 40% Final Exam

◎ Students may not do any additional work for extra credit nor resubmit any graded activity to raise a final grade.

◎ Late submissions will not be accepted for any graded activity for any reason.

◎ Studentshave one week to request the re-grading of any semester work.

Attendance Policy:

Students should attend 80% of the overall course hours taught in the semester as per the University regulations.

If a student fails to achieve this portion, he/she shall not be allowed to appear in the final exam and shall be awarded "DN" grade and repeat the course.

Cheating and Plagiarism Policy:

The instructor will use several manual and automated means to detect cheating and/or plagiarism in any work submitted by students for this course.

When a student is suspected of cheating or plagiarism, the instructor raises the issue to the disciplinary committee.

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Communications: Registered students will be given access to a section of the Blackboard Learning System for this course. Bb will used as the primary mechanism to disseminate course information, including announcements, lecture slides, assignments, and grades.

Communication with the instructor on issues relating to the individual student should be conducted using CIS email, via telephone, or in person.