Course Syllabus
- CSC 339 -

Semester: 1 (2023-2024)
Course title: Theory of Computation
Credit hours: 3
Instructor: Prof. Mohamed Menai (menai@ksu.edu.sa)
Website: https://faculty.ksu.edu.sa/en/menai
Office: 2174
Office hours: Sun. & Tue. 9-10 AM.

Goals of the course: The course introduces the foundations of automata, computability, and complexity theories. It shows the relationship between automata and formal languages. Addresses the issue of which problems can be solved by computational means (decidability vs undecidability), and introduces concepts related to the computational complexity of problems.

Prerequisite: CSC 281 "Discrete Mathematics for Computer Science"

Recommended textbook:
Introduction to the Theory of Computation, Michael Sipser (third edition, 2013), Publisher: Cengage Learning, ISBN-13: 978-1-133-18779-0.

Course Learning Outcomes:
Upon the completion of this course, the student should be able to:

- Identify regular and non-regular languages (K1)
- Identify decidable, non-decidable, NP-complete, and reducible problems (K1).
- Produce computing-based solutions using regular expressions, and context-free grammar (K2).
- Design different machine models (DFA, NFA, PDA, TM) – (S1).
- Evaluate the language accepted by a machine, regular expression, and context-free grammar (S1).
- Evaluate the time and space complexities of a Turing machine (S1).

Topics:

Topics	Planned Contact Hours
Introduction	1L
Languages	2L+1T
Finite state machines	4L+1T
Non-determinism	4L+1T
Regular expressions	4L+2T
Context-free languages	4L+1T
Pushdown automata	4L+2T
Turing machines	4L+2T
Decidability, Turing recognizability, and the halting problem	4L+1T
Undecidable problems	4L+1T
Time complexity	4L+1T
Space complexity	3L+1T

Evaluation:

- **Quizzes (3):**   20 marks   (weeks 3, 8, 13)
- **Midterm exam 1:**   20 marks   (week 6)
- **Midterm exam 2:**   20 marks   (week 11)
- **Final exam:**   40 marks   (TBA)

Notes for email communication:
- Your email header must start with *CSC339*
- Send your email to menai@ksu.edu.sa email address.
- Please write your name and your ID at the end of the email

Collaboration and attendance policies:
- Discussions about the course material are highly recommended. However, the student is not allowed to look at or copy any part of any homework or exam of other students. Plagiarism or any kind of cheating will not be tolerated and a student caught with that will end up having a grade F.
- A student with an absence rate of more than 25% will be denied from attending the final exam. An excuse for being absent is accepted only if it is legitimate and submitted within one week of the absence date.