Syllabus

Course

Time: Lecture/Lab: W/F 11:00–12:20
Place: AHN 215
Website: Blackboard

Instructor: Hamid R. Ekbia
Office: AHN 228
e-mail: *hamid_ekbia@redlands.edu*
Phone: x 3127
Office Hours: W.1:00 – 2:00, T/R. 4:00– 5:00 (or by appointment

Textbook: *Introduction to Computer Theory*
Second Edition
Daniel I.A. Cohen
John Wiley

Course Description

This course is probably the most foundational course in computer science. As its name implies, it is concerned with the *theory of computers* — that is, with mathematical models that approximate and abstract the real machines that we now call computers. More generally, however, it is concerned with *all possible* machines that can be built on similar abstractions (of which current computers are just one realization). As such, it could've been appropriately called the *theory of possibilities* or *capabilities*, because its proofs and conclusions equally apply to current machines (and current technologies) as to all future machines. This might not be the first time mathematical models anticipate their own practical applications, and it might not be the only time they have an absolute and timeless character, but it is certainly the first time they have contributed to the creation of a machine — the computer — that in a sense defines a whole historical era. Therefore, whether you are practically-minded as an engineer or theoretically-minded as a mathematician or logician, the topics in this course should interest you — only if you orient yourself towards it, that is.

Grading

Based on the above goals and the structure of the textbook, the final grade consists of four major components:

- Weekly assignments to be submitted on Fridays of each week (45%)
- Weekly quizzes on Friday of each week (15%)
- A mandatory final exam will be given on Saturday, April 22 at 9:00 am. (40%)
- You also have the option of getting extra credits (up to 20%) by writing a research paper on a related theoretical, technical, or historical topic.

Participation: All assignments, quizzes, and the final exam are meant to be done *individually*. Working together is allowed to the extent that it does not undermine the individual character of the activity in terms of the outcome. Please closely examine the University of Redlands' Standards of Academic Honesty.

Late hand-in is *not* accepted, except under documented emergency situations.

Schedule

Period	Topic	Reading	Assignments
Week 1: Jan. 09–13	• Background • Languages	Chs. 1&2	
Week 2: Jan. 16–20	• Recursive Definitions • Regular Expressions	Ch. 3 & 4	
Week 3: Jan.23–27	• Finite Automata	Ch. 5	
Week 4: Jan.30– Feb.3	• Transition Graphs • Kleene's Theorem	Ch. 6 & 7	
Week 5: Feb. 6–10	• Finite Automata with Output	Ch. 8	
Week 6: Feb. 13-17	• Regular Languages • Non-regular Languages	Ch. 9 & 10	
Week 7: Feb. 20–24	• Decidability	Ch. 11	
Feb. 27– March 03	Spring Break		
Week 8: March 06–10	• Context-Free Grammars	Ch. 12	
Week 9: March 13–17	• Grammatical Format	Ch. 13	
Week 10: March 20-24	• Pushdown Automata • Equivalence of PDA and CFG	Ch.14 & 15	
Week 11: March 27-31	• Non-Context-Free Languages	Ch. 16	
Week 12: April 03–07	• Context-Free Languages	Ch. 17	
Week 13: April 10–14	• Decidability	Ch. 18	
Week 14: April 17	• Turing Machines	Ch. 19	
Final's Week	**Final Exam: April 22, 9:00 AM**		