San José State University
College of Science/Department of Compute Science
CS 154_s4(47908): Formal Languages and Computability

Instructor(s):	Dr. Chung-Wen (Albert) Tsao
Telephone:	N/A
Email:	chung-wen.tsao@sjsu.edu (Once the class starts, use Canvas Inbox)
Class Days/Time:	T/TR 1:30 – 2:45 pm
Classroom:	Live lectures take place using the Zoom Meeting at https://sjsu.zoom.us/j/87462685175 at the class time. Live lectures will be recorded and available on the same day.
Office Hours:	- T/Th 2:45pm – 3:30pm (right after the live lecture) at https://sjsu.zoom.us/j/87462685175 - By appointments
Office Location:	Zoom meeting using the same link for the live lectures.
Prerequisites:	Math 42 Discrete Mathematics Grade C- or better CS 46B Introduction to Data Structure Grade C- or better
Class Meeting Dates:	Jan 27, 2021- May 17, 2021
Units:	3

Course Description
> Finite automata, context-free languages, Turing machines, computability.

Faculty Web Page and MYSJSU Messaging
> Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on MySJSU Canvas. You are responsible for regularly checking with the email system through MySJSU at http://my.sjsu.edu to learn of any updates.

Course Learning Outcomes (CLO)
Upon successful completion of this course, students would be able to:
1. Understand the high-level building blocks of computer science.
2. Analyze and design deterministic and non-deterministic machines for various formal languages.
3. Describe regular languages in terms of regular expressions and vice versa.
4. Analyze and design pushdown automata for some formal languages.
5. Analyze and design Turing machines for some formal languages.
6. Describe the properties of various automata and formal languages.
7. Construct different type of grammars (regular, context-free, etc.) for some formal languages.
8. Use the pumping lemma to prove that some formal languages are not regular.
9. Describe decidability and classify problems as decidable or undecidable.
10. Describe computability and complexity of problems.
11. Categorize languages based on their complexities.
12. Be familiar with some open-questions in computer science.

Required Text:

Introduction to the Theory of Computation (Third Edition), by Michael Sipser.

Optional Text:

Limits of Computation: An Introduction to the Undecidable and the Intractable, by Edna E. Reiter, Clayton Matthew Johnson.

Assignments:
    There will be *eight* assignments in total.
- **Late assignments will NOT be accepted for any reason.**
- All homework must clearly indicate each student's name, course, and assignment number.
- Students are allowed (and actively encouraged) to form study groups.
- You may discuss solutions but you MUST write up the answers independently.
- If you use a website or reference book, you must cite it.
- If there are multiple similar submissions not exhibiting independent thought, or with words obviously lifted from a book or website, all such submissions will receive scores of 0.

LockDown Browser + Webcam Requirement:
        This course requires the use of LockDown Browser and a webcam for online quizzes/exams. The webcam can be the type that's built into your computer or one that plugs in with a USB cable. Watch this brief video to get a basic understanding of LockDown browser and the webcam feature. Download and install LockDown browser from here.

Pop Quizzes:
        We will have pop quizzes to check your understanding of the current lecture material. The quizzes are usually explained in class and due on the end of the lecture day. The purpose of pop quizzes is to encourage you to study and review the concepts and materials we discussed in the lecture.

Exams:
    There will be two midterm examinations, and a cumulative final exam.

- Exams typically include an in-class closed-book quiz and a take-home open-book written test.
- Exams may NOT be taken before or after the scheduled time for any reason. All the students need to attend synchronously.
- No make-up exams for anyone except for the medical emergency with the official medical proof.
- Use of electronic devices during exams is NOT allowed unless stated otherwise.
- All exams will remain with the instructor.

Grading:
- Pop Quizzes   (10%)
- Midterm exam 1   (20%)
- Midterm exam 2   (20%)
- Homework   (25%)
- Final exam   (25%)

The grading scale is as follows:
Final grades will not be adjusted in any way - so an 89.99% is still a B+.
No incomplete grades will be given.

A+	≥ 97%	A	93%	A-	90%

B+	87%	B	83%	B-	80%
C+	77%	C	73%	C-	70%
D+	67%	D	63%	D-	60%
F	below 60.0%				

:
Classroom Protocol and Other Notes
- **Missing the first two lectures and quizzes may be dropped out from the class by the instructor.**
- **No late assignments will be accepted without advanced arrangement with the instructor.**
- Do not ask for special treatment. The rules for this course apply to everyone equally.
- Cheating will not be tolerable; a ZERO will be given to any cheated assignment/exams, and it will be reported to the Department and the University.
- Do NOT share/post online any course materials, PPT slides, or homework solutions.
- Use of electronic devices during exams is NOT allowed unless stated otherwise.
- You are required to check Canvas for reading/assignments.
- The information on this syllabus is subject to change; changes, if any, will be clearly explained in class, and it is your responsibility to become aware of them.
- Once the class starts, use Canvas Inbox to email me for a faster response. I check the Canvas Inbox emails much more often than my school emails.

Attendance
University policy F69-24 at http://www.sjsu.edu/senate/docs/F69-24.pdf states that students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class.

Consent for Recording of Class and Public Sharing of Instructor Material:
University Policy S12-7, http://www.sjsu.edu/senate/docs/S12-7.pdf, requires students to obtain instructor's permission to record the course: Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor's permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material. Course material cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor's consent.

University Policies
Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/". Make sure to review these policies and resources.

Tentative Course Schedule (This schedule is subject to change with fair notice via Canvas)

Week	Topics	Chapter	Assignments
1	Syllabus, Introduction	0	
2	Finite Automata, DFA, NFA	1	HW #1 Assigned

3	Regular Expressions, Regular Languages	1	
4	Pumping Lemma	1	HW #2 Assigned
5	Context-free Grammars	0-1	
6	Push-down Automata, Pumping Lemma,	2	HW #3 Assigned
7	Midterm Exam I	2	
8	Turing machines	2	HW #4 Assigned
9	Other Models of Turing machines	3	
10	Nondeterministic Turing machines	3	HW #5 Assigned
11	Decidable Languages	0-3	
12	Review Midterm II	3	HW #6 Assigned
13	Decidability, Undecidability	4	HW #7 Assigned
14	Reducibility	5	HW #8 Assigned
15	Review	5	
17	Final Exam	0-5	Thursday, May 20 12:15-14:30pm