SJSU SAN JOSÉ STATE UNIVERSITY

College of Science · Computer Science

Formal Languages and Computability

CS 154

Fall 2025 Section 01 In Person 3 Unit(s) 08/20/2025 to 12/08/2025 Modified 08/16/2025

Contact Information

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Office: Online

Course materials, including handouts, notes, assignment instructions, and more, are available on the Canvas Learning Management System at https://sjsu.instructure.com.

Students are responsible for checking Canvas regularly—at least once per day—to stay informed about assignments and due dates.

Office Hours

TR 15:00 - 16:30
Online, by appointment

Please send me an email at least six hours before your requested office hour time.

The best ways to ask questions are by starting a discussion on Canvas or posting in the course Discord.

Classroom Protocols

Consent for Recording of Class and Public Sharing of Instructor's Material

- Common courtesy and professional behavior require notifying individuals when you are recording them.
- You must obtain the instructor’s written permission to make audio or video recordings in this class.
- Such permission is granted solely for your private study purposes.
- These recordings are the intellectual property of the instructor, and you are not authorized to reproduce or distribute them without explicit written consent.

In-Person Class Protocol

- Please be on time.
- Cell phones must be set to silent mode and kept in your pocket or backpack; they should not be used during lectures.
- Laptops should remain closed unless I indicate they are needed for a specific activity, except when being used for note-taking.
- Activities such as instant messaging, emailing, texting, tweeting, or similar distractions are strictly prohibited in class.
- While attendance is highly recommended, it is not mandatory, except for exam times.

Online Class Protocol

- All microphones will be automatically muted when you join the Zoom meeting.
- If you have any questions, you may unmute yourself and speak or type your question in the chat room.
- The chat room will be private, and the instructor will read your questions aloud and respond.
- Cameras will not be used during lectures but will be required during exams. Therefore, please dress appropriately, adhering to a "Business Casual" dress code.
- Attendance is highly recommended but not mandatory, except for exams.

Program Information

Diversity Statement - At SJSU, it is important to create a safe learning environment where we can explore, learn, and grow together. We strive to build a diverse, equitable, inclusive culture that values, encourages, and supports students from all backgrounds and experiences.

Course Learning Outcomes (CLOs)

Upon successful completion of this course, students would be able to:

- Understand the high-level building blocks of computer science.
- Analyze and design deterministic and non-deterministic machines for various formal languages.
- Describe regular languages in terms of regular expressions and vice versa.
- Analyze and design pushdown automata for some formal languages.
- Analyze and design Turing machines for some formal languages.
- Describe the properties of various automata and formal
- Construct different type of grammars (regular, context-free, etc.) for some formal languages.
- Use the pumping lemma to prove that some formal languages are not regular.
- Describe decidability and classify problems as decidable or undecidable.
- Describe computability and complexity of problems.
- Categorize languages based on their complexities.

- Be familiar with some open-questions in computer science.

Course Materials

This course does not have a required textbook. My lecture notes contain all required materials.

Further Readings

1. Peter Linz, "*An Introduction to Formal Languages and Automata*," 5th edition, Jones & Bartlett Learning, ISBN-13: 978-1449615529
2. The references at the end of each lecture note.

Course Requirements and Assignments

Requirements

- A computer with microphone and camera is required for online activities (lectures, office hours, exams, etc.).

Workload

- Success in this course is based on the expectation that students will spend at least 6 – 10 hours per week for:
  - Working on assignments.
  - Preparation for the exams (quizzes, midterms, and final).
  - Working on the term project.
- More details about student workload can be found in University Policy S16-9 available at http://www.sjsu.edu/senate/docs/S16-9.pdf.

Grading Information

- **To make the good habit of reviewing the materials regularly**, there will be a weekly short quiz.
- There will be two midterms, and a final exam.
- **To practice the covered materials in a real software project**, there will be a term project and several individual assignments.
- All examinations would cover from the beginning of the semester.
- All examinations would be closed-all-materials.
- **There won't be any makeup for the exams.**
- **To practice time management**, **late submissions** will lose 20% of the total assignment score and an additional 20% for each 24-hour afterward.

Assignments	10%
Term Project	15%
Quizzes	30%
Midterm #1	10%
Midterm #2	15%
Final	20%
Total	**100%**

Nominal Grading Scale

From	To	Grade
97	100	A plus
93	96.99	A
90	92.99	A minus
87	89.99	B plus
83	86.99	B
80	82.99	B minus
77	79.99	C plus
73	76.99	C
70	**72.99**	**C minus**
67	69.99	D plus
63	66.99	D
60	62.99	D minus
0	59.99	F

University Policies

Per University Policy S16-9 (PDF) (http://www.sjsu.edu/senate/docs/S16-9.pdf), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on the Syllabus Information (https://www.sjsu.edu/curriculum/courses/syllabus-info.php) web page. Make sure to visit this page to review and be aware of these university policies and resources.

Course Schedule

Note: This is a tentative schedule and is subject to change but with fair notice.

Day#	Date	Lec#	Topics	Exams (Fridays)
1	08/20	0	Greensheet; A big picture of the course	
2	08/25	1	Mathematical preliminaries (part 1);	
3	08/27	2	Mathematical preliminaries (part 2);	Quiz 0
4	09/01		Labor Day Holdiday	
5	09/03	3	Formal Languages	Quiz 1
6	09/08	4	Deterministic finite automata (part 1);	
7	09/10	5	Deterministic finite automata (part 2);	Quiz 2
8	09/15	6	Deterministic finite automata (part 3);	
9	09/17	7	Nondeterministic finite automata (part 1);	Quiz 3
10	09/22		Review, Study Guide, Q & A	
11	09/24		Exam: Mid 1	Quiz +

Day#	Date	Lec#	Topics	Exams (Fridays)
12	09/29	8	Nondeterministic finite automata (part 2);	
13	10/01	9	Regular languages	Quiz 4
14	10/06	10	Pushdown automata (part 1);	
15	10/08	11	Pushdown automata (part 2);	Quiz 5
16	10/13	12	Turing machines (part 1);	
17	10/15	13	Turing machines (part 2);	Quiz 6
18	10/20	14	Other mode and models of Turing machines	
19	10/22	15	Regular expressions (part 1);	Quiz 7
20	10/27	16	Regular expressions (part 2);	
21	10/29	17	Grammars (part 1);	Quiz 8
22	11/03		Review, Study Guide, Q & A	
23	**11/05**		**Exam: Mid 2**	**Quiz ++**
24	11/10		Solution of Mid 2; Disucssions	
25	11/12	18	Grammars (part 2);	Quiz 9
26	11/17	19	Grammars (part 3);	
27	11/19	20	Non-regular languages (part 1);	Quiz 10

Day#	Date	Lec#	Topics	Exams (Fridays)
28	11/24	21	Non-regular languages (part 2);	
29	11/26		Thanksgiving Holiday	
30	12/01	22	Introduction to computability	
31	12/03	23	Introduction to complexity	
32	12/08		Study Guide, Q & A	

Final Exam

Start Date and Time	Wed, December 10 @ 3:15 PM
Duration	Will be announced in Study Guide
Venue	Our Classroom