SJSU SAN JOSÉ STATE UNIVERSITY

College of Science · Computer Science

Formal Languages and Computability

CS 154

Summer 2026 Section 01 In Person 3 Unit(s) 06/01/2026 to 08/07/2026 Modified 06/05/2026

Course Information

Course Canvas Page

https://sjsu.instructure.com/courses/1626768 (https://sjsu.instructure.com/courses/1626768)

Lecture Format

- **Time**: M/W 9:00 - 11:00
- **Room**: MacQuarrie Hall 225
- **Format**: in-person, and sessions will be recorded (except for exercises and Q&A).

Instructor

- Yan Chen (yan.chen01@sjsu.edu (mailto:yan.chen01@sjsu.edu))
- Office Hours M/W 11:30 - 12:30 in DH209
  or by Appointment (https://scheduler.zoom.us/yan-chen-rurbn3/su26 (https://scheduler.zoom.us/yan-chen-rurbn3/su26))

Grader & Tutor

- Grader: Vaishnavi Kouru (vaishnavi.kouru@sjsu.edu)
- Tutor (provided by Peer Connections): Nguyen Nguyen
  (https://www.sjsu.edu/peerconnections/programs/courses.php)

Course Description and Requisites

Finite automata, context-free languages, Turing machines, computability.

Prerequisite(s): MATH 42 or MATH 42X and CS 46B (with a grade of "C-" or better in each); Allowed Majors: Computer Science or Applied and Computational Mathematics; or instructor consent.

Letter Graded

Classroom Protocols

- Do NOT share any course material publicly (on Canvas, GitHub, etc.) without permission, including but not limited to lecture notes, lecture videos, passwords, homework/exam solutions, and class meeting/exam links.
- No late homework questions (within 24 hours before due, excluding follow-ups) via email.
- For all homework and exams, only use the notations mentioned in the class. Wrong/different notation(s) will be considered as wrong answer(s).
- **Instances of academic dishonesty will not be tolerated**. Your own commitment to learning, as evidenced by your enrollment at San José State University and the University's Academic Integrity Policy (https://www.sjsu.edu/senate/docs/F15-7.pdf), require you to be honest in all your academic course work. Cheating or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit, or use AI-generated text, etc.) will result in **a reduction in final course grade** (for assignments, one letter grade off every time except the first time; for the final, one letter grade off) and administrative sanctions by the University.

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 languages.
- 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

Textbook

There is no required text for this course other than all the materials (lecture notes, homework, etc.) on Canvas. You are responsible for **regularly checking the Canvas course page** for any updates, including its messaging system.

Equipment & software

- A laptop that can access the Internet (Canvas) and run the required software.
- An app called JFlap, which is downloadable from the course Canvas page. More details will be given in class.

Further Readings (optional)

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

Course Requirements and Assignments

The course will include class participation, weekly assignments, and a final exam. No high-level programming is required.

University Policy S16-9 (http://www.sjsu.edu/senate/docs/S16-9.pdf (http://www.sjsu.edu/senate/docs/S16-9.pdf)) states that:

> *"Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practice. Other course structures will have equivalent workload expectations as described in the syllabus."*

Untimed Canvas Quiz: In-class Exercises

In-class exercises will be posted as untimed Canvas quizzes each week and are **due on Wednesdays**. They will remain available on Canvas until the end of Thursday, but late submissions will receive a 20% penalty. **No submission will be accepted after the available time.**

Exercise 0 is mandatory and will be used to establish a committed presence in the course. Students who do not complete Exercise 0 or otherwise contact the instructor by the available-until deadline may be dropped from the course, consistent with university policy.

The exercise portion of class may not be included in the lecture recording. Exercises may include a required in-person component, which will be announced in advance.

Timed Canvas Quiz: Weekly Assignments

Assignments will be posted as timed Canvas Quizzes every week, **locked by passwords that are ONLY given in the lectures** (both in-person & recorded). Each assignment is cumulative, with more focus on the material learned during that week. The question types include multiple choices (will be graded as all-or-nothing), T/F, short answers, and automaton design problems. These assignments are **due on Sundays**. **A 20% late penalty per day will apply to late submissions.**

Team Project: TM Design

The course includes one team project covering material from the second half of the semester. The project must be completed with one partner. If the class has an odd number of students, one group of three may be allowed. More details, including project requirements, grading rubrics, and deadlines, will be posted around July 6.

Timed Canvas Quiz: Final Examination

The final exam will be cumulative and administered **in person** as a **2-hour timed Canvas quiz** during the scheduled exam period: Wednesday, **August 5, 9:00 - 11:00 a.m**. Pacific Time. Students should bring a laptop capable of accessing Canvas and running JFLAP (i.e., do NOT use Lockdown Browser). Exceptions may be granted only in cases of verifiable emergency.

The final exam is closed-all-materials. The only allowed software during the exam is the corresponding Canvas Quiz and JFLAP. Collaboration or use of unauthorized resources, including copying from another person, the internet, or AI tools, is not permitted and may result in a one-letter-grade reduction.

The final Exam is mandatory as University policy S17-1 (http://www.sjsu.edu/senate/docs/S17-1.pdf (http://www.sjsu.edu/senate/docs/S17-1.pdf)) states:

"Faculty members are required to have a culminating activity for their courses, which can include a final examination, a final research paper or project, a final creative work or performance, a final portfolio of work, or other appropriate assignment."

Various: (Optional) Extra Credits

There will be various extra credit activities throughout the semester, such as discussions, extra readings, challenging design problems, practice quizzes, etc. Unless specified, they are **due on Thursday, August 5**. **NO late submissions will be accepted**.

✓ Grading Information

Criteria

Note that the "weight" is not a percentage - they are "points". There will be at least 108 points available.

Type	Weight	Topic	Notes
In-class Exercises	12	Weekly	1.5 pts per week, lowest dropped
Weekly Assignments	28	Weekly	3.5 pts per week, lowest dropped
Team Project	10	TM Design	10 pts total
Final Exam	50	Cumulative	In-person Canvas Quiz on August 5, 9:00 - 11:00
Extra Credits	8+	Various	Extra credit opportunities throughout the semester.

Breakdown

The range also refers to "points", not percentages.

- A+ may be given to the top 1% of students (evaluated based on the assessment scores and class participation).
- Grades near the borderlines may be rounded up depending on your level and quality of class participation (in class and in the Discussions on Canvas).
- The grade might be curved ONLY if the final grades of the class at the end of the semester are not normal.

Grade	Range	Notes
A	Above 93	
A-	90 to 92.99	
B+	86 to 89.99	
B	83 to 85.99	
B-	80 to 82.99	
C+	76 to 79.99	
C	73 to 75.99	
C-	70 to 72.99	Passing grade
D+	66 to 69.99	
D	63 to 65.99	
D-	60 to 62.99	
F	Below 60	Contact instructor if want a WU instead

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

The lecture schedule below is tentative and subject to change with fair notice.

Visit https://www.sjsu.edu/current/summer/calendar.php?#session1-10 (https://www.sjsu.edu/current/summer/calendar.php#session1-10) for the Academic Calendar.

When	Topic	Notes
Tue, June 2		Last day to drop class for 100% refund
Wed, June 3		Last day to Drop without "W" grade, 75% refund
Week 0 (June 1 - 7)	Course Intro & Math Preliminaries	First lecture on June 1.
Week 1 (June 8 - 14)	Intro to Formal Languages	
Week 2 (June 15 - 21)	FA	
Week 3 (June 22 - 28)	FA & Regular Languages	
Week 4 (June 29 - July 5)	PDA	
Week 5 (July 6 - 12)	TM	
Week 6 (July 13 - 19)	REGEX	
Week 7 (July 20 - 26)	Grammar	
Week 8 (July 27 - August 3)	Computability & Complexity	
Week 9 (August 3 - 5)	Final Review & Final Exam	Final Exam on August 5, 9:00 - 11:00, in-person Canvas Quiz
Wed, August 5		All class activities are due

When	Topic	Notes
Fri, August 7		Last day to submit Petition for Course Drop or Withdrawal
Mon, August 10		Grade will be posted on Canvas
Fri, August 14		Grade will be posted to MySJSU
Sat, August 15		Grades (should be) viewable on MySJSU