

**San José State University**  
**Department of Computer Science**  
**CS154, Formal Languages and Computation, Section 5**  
**Spring Semester, 2016**

**Course and Contact Information**

<b>Instructor:</b>	Thaddeus Aid
<b>Office Location:</b>	DH282
<b>Email:</b>	Thaddeus.aid@sjsu.edu
<b>Office Hours:</b>	Sat 16:00-17:30 (or by appointment)
<b>Class Days/Time:</b>	Sat: 10:00-12:45
<b>Classroom:</b>	MH 225
<b>Prerequisites:</b>	Math 42 and CS 46B (with a grade of "C-" or better in each)

**Course Description**

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

**Learning Outcomes**

**Course Learning Outcomes (CLO)**

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

1. CLO1. Construct and use regular expressions and finite automata.
2. CLO2. Construct and use context-free grammars and pushdown automata.
3. CLO3. Construct and use simple Turing machines.
4. CLO4. Describe the properties of various automata and languages.
5. CLO5. Use pumping lemmas to show non-membership in a language category.
6. CLO6. Turn a non-deterministic finite automaton into a deterministic one.
7. CLO7. Minimize a deterministic finite automaton.
8. CLO8. Describe closure properties of languages, and state minimization of automata.
9. CLO9. Describe decidability and classify basic problems as decidable or not.

**Required Texts/Readings**

**Textbook**

*Introduction to Theory of Computation by Anil Maheshwari and Michiel Smid*  
Download at <http://cglab.ca/~michiel/TheoryOfComputation/TheoryOfComputation.pdf>  
The course website is <https://sjsu.instructure.com/courses/1190371>

## **Other Readings [Optional]**

*Links to online material will be provided*

## **Course Requirements and Assignments**

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in [University Policy S12-3](http://www.sjsu.edu/senate/docs/S12-3.pdf) at <http://www.sjsu.edu/senate/docs/S12-3.pdf>.

*There will be 3 homework assignments, each worth 10% of your grade.*

*There will be 1 homework assignment worth 20% of your grade.*

*There will be 1 midterm (20%) and 1 final (30%)*

NOTE that [University policy F69-24](http://www.sjsu.edu/senate/docs/F69-24.pdf) 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. Attendance per se shall not be used as a criterion for grading.”

## **Grading Policy**

*Grading:*

*50% Coursework*

*20% Midterm*

*30% Final*

*Final Grades:*

*90% or higher A*

*80-89% B*

*70-79% C*

*60-69% D*

*59% or lower F*

*If the unit digit is 7-9 [Letter] +*

*If the unit digit is 0-2 [Letter] –*

*Example 82% would be B-*

Note that “All students have the right, within a reasonable time, to know their academic scores, to review their grade-dependent work, and to be provided with explanations for the determination of their course grades.” See [University Policy F13-1](http://www.sjsu.edu/senate/docs/F13-1.pdf) at <http://www.sjsu.edu/senate/docs/F13-1.pdf> for more details.

## **University Policies**

### **General Expectations, Rights and Responsibilities of the Student**

As members of the academic community, students accept both the rights and responsibilities incumbent upon all members of the institution. Students are encouraged to familiarize themselves with SJSU’s policies and

practices pertaining to the procedures to follow if and when questions or concerns about a class arises. See [University Policy S90-5](http://www.sjsu.edu/senate/docs/S90-5.pdf) at <http://www.sjsu.edu/senate/docs/S90-5.pdf>. More detailed information on a variety of related topics is available in the [SJSU catalog](http://info.sjsu.edu/web-dbggen/narr/catalog/rec-12234.12506.html), at <http://info.sjsu.edu/web-dbggen/narr/catalog/rec-12234.12506.html>. In general, it is recommended that students begin by seeking clarification or discussing concerns with their instructor. If such conversation is not possible, or if it does not serve to address the issue, it is recommended that the student contact the Department Chair as a next step.

### **Dropping and Adding**

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's [Catalog Policies](http://info.sjsu.edu/static/catalog/policies.html) section at <http://info.sjsu.edu/static/catalog/policies.html>. Add/drop deadlines can be found on the current academic year calendars document on the [Academic Calendars webpage](http://www.sjsu.edu/provost/services/academic_calendars/) at [http://www.sjsu.edu/provost/services/academic\\_calendars/](http://www.sjsu.edu/provost/services/academic_calendars/). The [Late Drop Policy](http://www.sjsu.edu/aars/policies/latedrops/policy/) is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the [Advising Hub](http://www.sjsu.edu/advising/) at <http://www.sjsu.edu/advising/>.

### **Consent for Recording of Class and Public Sharing of Instructor Material**

[University Policy S12-7](http://www.sjsu.edu/senate/docs/S12-7.pdf), <http://www.sjsu.edu/senate/docs/S12-7.pdf>, requires students to obtain instructor's permission to record the course and the following items to be included in the syllabus:

- “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.”
  - It is suggested that the greensheet include the instructor's process for granting permission, whether in writing or orally and whether for the whole semester or on a class by class basis.
  - In classes where active participation of students or guests may be on the recording, permission of those students or guests should be obtained as well.
- “Course material developed by the instructor is the intellectual property of the instructor and 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 consent.”

Note from the instructor: I give permission for my lecture notes to be shared under the Creative Commons Attribution + Share a Like License version 4. I give permission for my lectures to be recorded either audio/video and shared under the Creative Commons Attribution + Share a Like License version 4. As a request, if you do record my lectures please offer me the chance to put them on my YouTube or other media site for public consumption of education.

**I DO NOT** give permission for solutions to problems or exams to be shared.

### **Academic integrity**

Your commitment, as a student, to learning is evidenced by your enrollment at San Jose State University. The [University Academic Integrity Policy S07-2](http://www.sjsu.edu/senate/docs/S07-2.pdf) at <http://www.sjsu.edu/senate/docs/S07-2.pdf> requires you to be

honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The [Student Conduct and Ethical Development website](http://www.sjsu.edu/studentconduct/) is available at <http://www.sjsu.edu/studentconduct/>.

### **Campus Policy in Compliance with the American Disabilities Act**

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. [Presidential Directive 97-03](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) at [http://www.sjsu.edu/president/docs/directives/PD\\_1997-03.pdf](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) requires that students with disabilities requesting accommodations must register with the [Accessible Education Center](http://www.sjsu.edu/aec) (AEC) at <http://www.sjsu.edu/aec> to establish a record of their disability.

# CS154 Formal Languages and Computability, Spring 2016, Course Schedule

Lecture topics are subject to change based on need, where available as much advanced warning will be provided via email.

## Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	01/30/2016	History of computers and programming
1	01/30/2016	Introduction to Formal Languages and Computability
2	02/06/2016	Mathematics and Proof Review
2	02/06/2016	Finite State Automata
3	02/13/2016	Finite State Automata
3	02/03/2016	Regular Expressions
4	02/20/2016	Context Free Languages
4	02/20/2016	Push Down Automata Homework 1 due 02/26/2016 before 23:59
5	02/27/2016	Turing Machines
5	02/27/2016	Church-Turing Hypothesis
6	03/05/2016	Decidable and Undecidable Languages
6	03/05/2016	Decidable and Undecidable Languages
7	03/12/2016	Complexity Theory
7	03/12/2016	Complexity Theory Homework 2 due on 03/18/2016 before 23:59
8	03/19/2016	The Halting Problem
8	03/19/2016	Review for Mid Term
9	03/26/2016	Mid Term
9	03/26/2016	Mid Term
10	04/02/2016	Spring Break – No Class
10	04/02/2016	Spring Break – No Class
11	04/09/2016	Space Complexity
11	04/09/2016	Space Complexity Homework 3 due 04/15/2016 before 23:59
12	04/16/2016	Parallel and Concurrent Complexity
12	04/16/2016	Parallel and Concurrent Complexity

<b>Week</b>	<b>Date</b>	<b>Topics, Readings, Assignments, Deadlines</b>
13	04/23/2016	Randomization
13	04/23/2016	Randomization
14	04/30/2016	Quantum Computing
14	04/30/2016	Quantum Computing
15	05/07/2016	TDB – This lecture intentionally left blank to allow for targeted needs
15	05/07/2016	TDB – This lecture intentionally left blank to allow for targeted needs Homework 4 due on 05/13/2016 before 23:59
16	05/14/2016	Review for Final
Final Exam	05/21/2016	In the normal class space/time