

Course Information

Course Number: CSCE 433 / CSCE 627
Course Title: Formal Languages and Automata / Theory of Computability
Section: 500 / 600
Time: MWF 11:30 AM – 12:20 PM
Location: HRBB 113
Credit Hours: 3 / 3

Instructor Details

Instructor: Prof. Jianer Chen
Office: PETR 428
Phone: 979-845-4259
E-Mail: chen@cse.tamu.edu (best way to contact)
Office Hours: MWF 10:30 – 11:30 PM; other times by appointment

Teaching Assistant: XXX YYYY
E-Mail: xyyy@tamu.edu
Office Hours: ??; other times by appointment

Course Description

CSCE 433: Basic types of abstract languages and their acceptors; the Chomsky hierarchy; solvability and recursive function theory; application of theoretical results to practical problems.

CSCE 627: Formal models of computation such as pushdown automata; Turing machines and recursive functions; unsolvability results; complexity of solvable results.

Course Prerequisites

CSCE 433: CSCE 315 or approval of instructor.

CSCE 627: Catalog states CSCE 433, but this is not necessary.

For both courses, the actual prerequisite is a basic class in data structures and algorithms, such as CSCE 221 or equivalent, and a basic class in discrete mathematics, such as CSCE 222, MATH 302 or equivalent.

Special Course Designation

This is a stacked course. Exams and homeworks will be customized with some parts only for CSCE 433 students and some parts only for CSCE 627 students.

Course Learning Outcomes

The course goals are (1) to introduce you to the theoretical foundations of computer science concerning the relationships between languages and machines, the inherent limits of what can be computed, and the inherent efficiency of solving problems; (2) to familiarize you with the applications of these

theoretical topics to practical problems; and (3) to increase your ability to recognize and create rigorous mathematical arguments.

Textbook and/or Resource Materials

Textbook:

Michael Sipser (2013),
Introduction to the Theory of Computation, Third Edition,
 Cengage Learning, 2013.

Errata list is here: <https://math.mit.edu/~sipser/itoc-errs3.1.html>

Learning management system: We will use Canvas (canvas.tamu.edu) for posting class information, assignment turn-in, grades, and question-and-answer.

Grading Policy

Your grade will be based on these components:

- Grading Scale: A = 90-100%, B = 75-89%, C = 65-74%, D = 60-64%, F = 0-59%.
- The course has 6 homework assignments, two midterms, and a final exam.
- Homework assignment: 36%, Midterms: 15% each, Final exam: 34%.

Academic Integrity

Discussion of concepts with others is encouraged, but all assignments must be done on your own, unless otherwise instructed. If you use any source, you must reference it, whether it be a person, a paper, a book, a solution set, a webpage or whatever. You must write up the assignments in your own words. Copying is strictly forbidden.

Late Work Policy

The assignments are due on the designated due dates at the **beginning** of class. **No late submissions will be accepted.** Discuss unusual circumstances in advance with the instructor. Make-up assignments will only be available for university-excused absences; see Student Rule 7, Attendance (<http://student-rules.tamu.edu/rule07>).

Course Schedule

Week of	Lecture Topic	Textbook
1: Jan 19-21	Mathematics foundation, proof techniques	Chap 0
2: Jan 24-28	Automata theory, finite automata	Chap 1
3: Jan 31-Feb 4	Nondeterministic finite automata	Chap 1
4: Feb 7-11	Regular languages, closure properties	Chap 1
5: Feb 14-18	Non-regular languages, pumping lemma, midterm 1	Chap 1
6: Feb 21-25	Context-free languages (CFLs)	Chap 2
7: Feb 28-Mar 4	Pushdown Automata, pumping lemma for CFLs	Chap 2
8: Mar 7-11	Closure Properties for CFLs, Deterministic CFLs	Chap 2

9: Mar 14-18	Spring break	
10: Mar 21-25	Computability theory, Turing Machines	Chap 3
11: Mar 28-Apr 1	Decidability	Chap 4
12: Apr 4-8	Midterm 2, reducibility	Chap 5
13: Apr 11-15	Reducibility (cont.)	Chap 5
14: Apr 18-22	Complexity theory, NP-completeness	Chap 7
15: Apr 25-29	NP-completeness (cont.), space complexity	Chap 7, 8
16: May 2, 3	Space Complexity (cont.), Intractability	Chap 8, 9

Exam and Homework Dates:

Midterm 1: Friday, Feb 18 (taken in class)

Midterm 2: Monday, Apr 4 (taken in class)

Final Exam: Tuesday, May 10, 10:30 AM – 12:30 PM

Homework Due Dates: will be given in the homework assignment handouts

University Policies

Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to [Student Rule 7](#) in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to [Student Rule 7](#) in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" ([Student Rule 7, Section 7.4.1](#)).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" ([Student Rule 7, Section 7.4.2](#)).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See [Student Rule 24](#).)

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work,

should the instructor request it, may be sufficient grounds to initiate an academic misconduct case” ([Section 20.1.2.3, Student Rule 20](#)).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see [University Rule 08.01.01.M1](#)):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University’s goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with [Counseling and Psychological Services](#) (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University’s [Title IX webpage](#).

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student’s academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.

COVID-19 Temporary Addendum to Minimum Syllabus Requirements

The Faculty Senate temporarily added the following statements to the minimum syllabus requirements in Spring 2021 as part of the university's COVID-19 response.

Campus Safety Measures

To promote public safety and protect students, faculty, and staff during the coronavirus pandemic, Texas A&M University has adopted policies and practices for the Spring 2021 academic term to limit virus transmission. Students must observe the following practices while participating in face-to-face courses and course-related activities (office hours, help sessions, transitioning to and between classes, study spaces, academic services, etc.):

- Self-monitoring—Students should follow CDC recommendations for self-monitoring. **Students who have a fever or exhibit symptoms of COVID-19 should participate in class remotely if that option is available, and should not participate in face-to-face instruction.**
- Face Coverings—[Face coverings](#) (cloth face covering, surgical mask, etc.) must be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is difficult to reliably maintain. Description of face coverings and additional guidance are provided in the [Face Covering policy](#) and [Frequently Asked Questions \(FAQ\)](#) available on the [Provost website](#).
- Physical Distancing—Physical distancing must be maintained between students, instructors, and others in course and course-related activities.
- Classroom Ingress/Egress—Students must follow marked pathways for entering and exiting classrooms and other teaching spaces. Leave classrooms promptly after course activities have concluded. Do not congregate in hallways and maintain 6-foot physical distancing when waiting to enter classrooms and other instructional spaces.
- To attend a face-to-face class, students must properly wear an approved face covering. If a student refuses to wear a face covering, the instructor should ask the student to leave and join the class remotely. If the student does not leave the class, the faculty member should report that student to the [Student Conduct office](#) for sanctions. Additionally, the faculty member may choose to teach that day's class remotely for all students, or dismiss the class in the case of a traditional face to face lecture.

Personal Illness and Quarantine

Students required to quarantine must participate in courses and course-related activities remotely, if that option is available, and **must not attend face-to-face course activities**. Students should notify their instructors of the quarantine requirement. Students under quarantine are expected to participate in courses and complete graded work unless they have symptoms that are too severe to participate in course activities.

Students experiencing personal injury or illness that is too severe for the student to attend class qualify for an excused absence (See [Student Rule 7, Section 7.2.2.](#)) To receive an excused absence, students must comply with the documentation and notification guidelines outlined in Student Rule 7.