Computer Science 3383
Theory of Automata
Course Syllabus and Policy Statement
Spring 2020

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TA: TBA (if any) **TA Office:**_____ **TA E-mail:**_____

Office Hours: 10 - 11 MWF or by appointment. (Tentative, any changes to office hours will be announced)

Catalogue Listing: The relationship between language, grammars, and automata. Deterministic and nondeterministic machines. Pushdown automata and Turing machines. Limits of computability.

Texts: (optional) "Introduction to the Theory of Computation", by Michael Sipser, 3rd edition.
(free, on Blackboard) "Introduction to the Theory of Computation", by A. Maheshwari & M. Smid

Course objectives:

The objective of this course is to learn what can and cannot be represented by important classes of abstract machines and grammars, and to classify functions and relations into complexity classes such as P, NP, and NP-complete.

Key Topics:

Regular languages and finite state automata, context free languages and push down automata, Turing machines, Church's Thesis and the halting problem, complexity classes such as P, NP and NP-complete, proof techniques in automata theory such as pumping lemmas and diagonal arguments.

Course Prerequisites: CS 1382

Expected Prior Knowledge and Skills: programing and algorithm design experience

Learning Outcomes: Students who have completed this course should be

1. Familiar with formal methods, such as abstract machines and formal grammars, for defining infinite sets of strings by finite means. (1,6)
2. Able to classify these methods according to their expressive power. (1,6)
3. Able to state Church's Thesis, its significance, and arguments in its favor. (6)

Assessment methods of all of the above: quizzes, exams, assignments, and/or projects

Homework Policy:
Homework problems will be given during the semester. Homework will be graded solely on whether it attempted (check) or not (zero). Students should view homework as a means of identifying weaknesses in their understanding of a subject. This will hopefully lead to questions in class.

Grade Policy:
All tests will count towards the final grade; i.e. no exam grades will be "dropped". I do not give extra-credit, nor do I curve exams. A student may be given a grade higher than their course average provided each of the following hold (this will be made clearer when I go over the syllabus):

- the student shows improvement on questions covering material from previous tests
- the lower average is not due to missing homework/programming assignments

- the final exam grade is proportionally higher (a 1 to 2 ratio) than a given letter grade than the average is below it (e.g. A student whose average was 80 after the final would need to have at least a 95 on the final for an A to be considered and must meet the other conditions above).

Cheating on tests and programming assignments will not be tolerated. Any student caught cheating on an exam will be reported to the Office of Student Conduct. If found to be responsible, the student will receive an F for the course and possible further sanctions from the University.

Course Average Determination:

55% Test 1 & 2
35% Final
10% Homework

(There will be no extra-credit or curving of grades in the class.)

Course Grade Division:

90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
0 – 59	F

Lecture Schedule: (subject to change as necessary)

- The dates of the other two tests will be decided based on course progression and will be announced at ***least*** one week in advance. There will be an in class review the last class period before each test (including the final) and a class period spent going over each test on the day it is handed back.
- Job Fair - February 19 - No Class
- Holidays
  - January 20 Martin Luther King Jr. Day
  - March 14-22 Spring Break
  - April 13 Day of no classes
- Final exam is: Tuesday, May 12, 4:30 pm to 7:00 pm

# of Lectures	Subject (in order given)
1	Introduction to course
2	Sets and their Representation, what is a language, hierarchy
1	Introduction to Regular Languages
2	Deterministic Finite Automata
1	Nondeterministic Finite Automata
1	Finite Automata and Regular Languages
1	Languages that are not Regular
1	The Pumping Lemma for Regular Languages
1	Finite Automata and Algorithms
1	Context-Free Grammars and Languages
1	Reasoning about Context-Free Grammars
2	Pushdown Automata
1	Languages that are not Context-Free
1	The Pumping Lemma for Context-Free Languages
1	Chomsky Normal Form
2	Decidability on Context-Free Languages
1	Context Free-Languages and Parsing
2	Turing Machines
1	Computable Functions
1	Church-Turing Thesis
1	Extensions of Turing Machines
1	Grammars
1	Recursively Enumerable Languages
1	Universal Turning Machines
1	The Halting Problem
1	Undecidable Recursively Enumerable Languages
1	Church-Turing Thesis and the limits of Computation

1	Computational Complexity
1	P and NP Problems

Academic Conduct: Policy of the Department and the University will be followed. All work done in this course should conform to the *Statement of Academic Conduct for Engineering Students, College of Engineering, Texas Tech University*.

Attendance Policy:
• You are expected to be present for each class session.
• If you are absent, it is your responsibility to obtain class notes and handouts (if any) from your classmates; I will not necessarily keep extra copies of materials after they are initially distributed;
• There are no makeup exams or tests for unexcused absences.
• Absence due to religious observance - "Religious holy day" means a holy day observed by a religion whose places of worship are exempt from property taxation under Texas Tax Code §11.20. A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence. A student who is excused under section 2 may not be penalized for the absence; however, the instructor may respond appropriately if the student fails to complete the assignment satisfactorily.
• Whether an absence is excused or unexcused is determined solely by the instructor with the exception of absences due to religious observance and officially approved trips. The Center for Campus Life will notify faculty, at the student's request, when a student is absent for four consecutive days with appropriate verification of a health-related emergency. This notification does not excuse the student from class, it is provided as a courtesy. The service is explained as follows and can be found on the Center for Campus Life web site at: http://www.campuslife.ttu.edu/crisis/

Illness and Death Notification: The Center for Campus Life is responsible for notifying the campus community of student illnesses, immediate family deaths and/or student death. Generally, in cases of student illness or immediate family deaths, the notification to the appropriate campus community members occur when a student is absent from class for four (4) consecutive days with appropriate verification. It is always the student's responsibility for missed class assignments and/or course work during their absence. The student is encouraged to contact the faculty member immediately regarding the absences and to provide verification afterwards. The notification from the Center for Campus Life does not excuse a student from class, assignments, and/or any other course requirements. The notification is provided as a courtesy.

Academic Integrity:
Academic integrity is taking responsibility for one's own class and/or course work, being individually accountable, and demonstrating intellectual honesty and ethical behavior. Academic integrity is a personal choice to abide by the standards of intellectual honesty and responsibility. Because education is a shared effort to achieve learning through the exchange of ideas, students, faculty, and staff have the collective responsibility to build mutual trust and respect. Ethical behavior and independent thought are essential for the highest level of academic achievement, which then must be measured. Academic achievement includes scholarship, teaching, and learning, all of which are shared endeavors. Grades are a device used to quantify the successful accumulation of knowledge through learning. Adhering to the standards of academic integrity ensures grades are earned honestly. Academic integrity is the foundation upon which students, faculty, and staff build their educational and professional careers. [Texas Tech University ("University") Quality Enhancement Plan, Academic Integrity Task Force, 2010]

"It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and a high standard of integrity. The attempt of students to present as their own any work that they have not honestly performed is regarded by the faculty and administration as a serious offense and renders the offenders liable to serious consequences, possibly suspension."

"Scholastic dishonesty" includes, but is not limited to, cheating, plagiarism, collusion, falsifying academic records, misrepresenting facts, and any act designed to give unfair academic advantage to the student (such

as, but not limited to, submission of essentially the same written assignment for two courses without the prior permission of the instructor) or the attempt to commit such an act.

"Cheating" includes, but is not limited to, the following:
1. Copying from another student's test paper.
2. Using materials during a test that have not been authorized by the person giving the test.
3. Failing to comply with instructions given by the person administering the test.
4. Possessing materials during a test that are not authorized by the person giving the test, such as class notes or specifically designed "crib notes." The presence of textbooks constitutes a violation only if they have been specifically prohibited by the person administering the test.
5. Using, buying, stealing, transporting, or soliciting in whole or part the contents of an unadministered test, test key, homework solution, or computer program.
6. Collaborating with or seeking aid or receiving assistance from another student or individual during a test or in conjunction with an assignment without authority.
7. Discussing the contents of an examination with another student who will take the examination.
8. Divulging the contents of an examination, for the purpose of preserving questions for use by another, when the instructor has designated that the examination is not to be removed from the examination room or not to be returned to or kept by the student.
9. Substituting for another person, or permitting another person to substitute for oneself to take a course, a test, or any course related assignment.
10. Paying or offering money or other valuable thing to, or coercing another person to obtain an un-administered test, test key, homework solution, or computer program, or information about an un-administered test, test key, homework solution, or computer program.
11. Falsifying research data, laboratory reports, and/or other academic work offered for credit.
12. Taking, keeping, misplacing, or damaging the property of the university, or of another, if the student knows or reasonably should know that an unfair academic advantage would be gained by such conduct.

"Plagiarism" includes, but is not limited to, the appropriation of, buying, receiving as a gift, or obtaining by any means material that is attributable in whole or in part to another source, including words, ideas, illustrations, structure, computer code, other expression and media, and presenting that material as one's own academic work being offered for credit. Any student who fails to give credit for quotations or for an essentially identical expression of material taken from books, encyclopedias, magazines, Internet documents, reference works or from the themes, reports, or other writings of a fellow student is guilty of plagiarism.

"Collusion" includes, but is not limited to, the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any section of the rules on scholastic dishonesty.

Civility in the Classroom:
Texas Tech University is a community of faculty, students, and staff that enjoys an expectation of cooperation, professionalism, and civility during the conduct of all forms of university business, including the conduct of student–student and student–faculty interactions in and out of the classroom. Further, the classroom is a setting in which an exchange of ideas and creative thinking should be encouraged and where intellectual growth and development are fostered. Students who disrupt this classroom mission by rude, sarcastic, threatening, abusive or obscene language and/or behavior will be subject to appropriate sanctions according to university policy. Likewise, faculty members are expected to maintain the highest standards of professionalism in all interactions with all constituents of the university (www.depts.ttu.edu/ethics/matadorchallenge/ethicalprinciples.php).

Students with Disabilities
ADA Statement: Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as possible to make necessary arrangements. Students must present appropriate verification from Student Disability Services during the instructor's office hours. Please note that instructors are not allowed to provide classroom accommodation to a student until

appropriate verification from Student Disability Services has been provided. For additional information, please contact Student Disability Services office in 335 West Hall or call 806-742-2405.