

Course Syllabus

CSCI549-01B
AUTOMATA THEORY
Spring, 2020

Class Meetings: Thursdays 11:00AM – 12:30PM (Classroom: Jour 104)

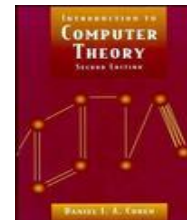
Instructor:

Name: Dr. S. Suh, Regents Professor, Texas A&M University System
Department of Computer Science
Office: Jour 223;
Office Hours: T 2:00-5:00PM, R 2:00-5:00PM, others by appointment
Phone: 903.468.8199;
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Preferred form of communication: Email
Communication response time: 48 hours

Textbook required:

Introduction to Computer Theory by Daniel I. A. Cohen
John Wiley & Sons, Inc., 1997, 2nd Ed. ISBN 0-471-13772-3



Textbook Organization:

PART I: Chapters 1,2,3,4,5,6,7,8,9,10 and 11
PART II: Chapters 12,13,14,15,16 and 17
PART III: Chapters 19 and 20

Course Description:

Hours (3 SCH). This course teaches the general theory, concept, and techniques related to the theory of automata. Practical examples related to programming languages are emphasized. Students will have the opportunity to utilize theoretical aspects of automata theory by performing a medium-scale design project. Topics include: Finite Automata, Transition Graphs, Nondeterminism, Finite Automata with Output, Context-Free Grammars, Regular Grammars, Chomsky Normal Form, Pushdown Automata, Context-Free Languages, Non-Context-Free Languages, Parsing, and Turing Machines. Prerequisite: [CSCI 515](#).

Course Objectives:

This course is one of the five core courses for M.S. degree in Computer Science at Texas A&M University - Commerce. The primary goal of this course is to provide fundamental introduction to the design of programming languages (PL). Both the theoretical foundations of PL and its practical aspect will be studied by covering chapters 1 through 20. The fundamental topics to be covered in this course include regular expressions, finite automata, (non-)regular languages, context-free grammars, regular grammars, Chomsky normal forms, pushdown automata, (non-)context-free languages, parsing and Turing machines. These fundamentals are essential prerequisite for those who may pursue more advanced topics and applications of Computer Science. Since the ultimate goal of automata theory is the construction of efficient program

languages, no study of automata is complete without some experience designing grammars. For this purpose, a medium-scale program language design project will be assigned as a class project. The design project is an essential part of the successful course completion. The grading will be based on the following criteria:

STUDENT LEARNING OUTCOMES (SLO):

1. Understand the concept of formal languages through such mechanism as regular expression, recursive definitions, finite automata, transition graph, Mealy machine and Moore machine.
2. Apply Kleene’s theorem and pumping lemma for the design and management of regular and non-regular languages.
3. Construct context free, regular, Chomsky normal form grammars to design computer languages
4. Design and construct a pushdown automata and a Turing machine for a computer language
5. Design and implement the LR(1) parser for a computer language

COURSE REQUIREMENTS:

Minimal Technical Skills Needed

Using Microsoft Word and PowerPoint, using presentation and graphics programs, etc.

Instructional Methods

Delivery modalities: Face to face blended with D2L online platform

Course structure: Lecture-oriented course

Learning activities: Interactive problem-solving in class, Q&A session, team projects and exercise practice

Assessments: Quizzes, tests, project development, and presentation

Tips for Success in the Course

Completion of weekly exercise assignment (2 hours estimated weekly)

Weekly preview of chapters to be covered (2 hours estimated weekly)

Review of chapters covered (1 hour estimated weekly)

Student Responsibilities:

Regular attendance of class. In case of absence, the student is responsible for the make-up of covered material.

Method of Evaluation (*Tentative*):

- Tests (70%, in class - closed book – 25/45 or 15/15/40)
- Quizzes and Participation (15%)
- Implementation Project (15%)

Final grades in this course will be based on the following scale:

- A = 90%-100%
- B = 80%-89%
- C = 70%-79%
- D = 60%-69%
- F = 59% or Below

Relationship between the assessments and course-level student learning outcomes:

Student Learning Outcomes	SLO1	SLO2	SLO3	SLO4	SLO5
Assessment Methods Used	Midterm Exam, Quizzes	Midterm Exam, Quizzes	Final Exam, Quizzes	Final Exam, Quizzes	Course Project, Project Test

TECHNOLOGY REQUIREMENTS:

Browser support

D2L is committed to performing key application testing when new browser versions are released. New and updated functionality is also tested against the latest version of supported browsers. However, due to the frequency of some browser releases, D2L cannot guarantee that each browser version will perform as expected. If you encounter any issues with any of the browser versions listed in the tables below, contact D2L Support, who will determine the best course of action for resolution. Reported issues are prioritized by supported browsers and then maintenance browsers.

Supported browsers are the latest or most recent browser versions that are tested against new versions of D2L products. Customers can report problems and receive support for issues. For an optimal experience, D2L recommends using supported browsers with D2L products.

Maintenance browsers are older browser versions that are not tested extensively against new versions of D2L products. Customers can still report problems and receive support for critical issues; however, D2L does not guarantee all issues will be addressed. A maintenance browser becomes officially unsupported after one year.

Note the following:

- Ensure that your browser has JavaScript and Cookies enabled.
- For desktop systems, you must have Adobe Flash Player 10.1 or greater.
- The Brightspace Support features are now optimized for production environments when using the Google Chrome browser, Apple Safari browser, Microsoft Edge browser, Microsoft Internet Explorer browser, and Mozilla Firefox browsers.

Desktop Support

Browser	Supported Browser Version(s)	Maintenance Browser Version(s)
Microsoft® Edge	Latest	N/A
Microsoft® Internet Explorer®	N/A	11
Mozilla® Firefox®	Latest, ESR	N/A
Google® Chrome™	Latest	N/A
Apple® Safari®	Latest	N/A

Tablet and Mobile Support

Device	Operating System	Browser	Supported Browser Version(s)
Android™	Android 4.4+	Chrome	Latest
Apple	iOS®	Safari, Chrome	The current major version of iOS (the latest minor or point release of that major version) and the previous major version of iOS (the latest

Device	Operating System	Browser	Supported Browser Version(s)
			minor or point release of that major version). For example, as of June 7, 2017, D2L supports iOS 10.3.2 and iOS 9.3.5, but not iOS 10.2.1, 9.0.2, or any other version. Chrome: Latest version for the iOS browser.
Windows	Windows 10	Edge, Chrome, Firefox	Latest of all browsers, and Firefox ESR.

- You will need regular access to a computer with a broadband Internet connection. The minimum computer requirements are:
 - 512 MB of RAM, 1 GB or more preferred
 - Broadband connection required courses are heavily video intensive
 - Video display capable of high-color 16-bit display 1024 x 768 or higher resolution
- You must have a:
 - Sound card, which is usually integrated into your desktop or laptop computer
 - Speakers or headphones.
 - *For courses utilizing video-conferencing tools and/or an online proctoring solution, a webcam and microphone are required.
- Both versions of Java (32 bit and 64 bit) must be installed and up to date on your machine. At a minimum Java 7, update 51, is required to support the learning management system. The most current version of Java can be downloaded at: [JAVA web site](http://www.java.com/en/download/manual.jsp)
- Current anti-virus software must be installed and kept up to date.

Running the browser check will ensure your internet browser is supported.

Pop-ups are allowed.
JavaScript is enabled.
Cookies are enabled.

- You will need some additional free software (plug-ins) for enhanced web browsing. Ensure that you download the free versions of the following software:
 - [Adobe Reader](https://get.adobe.com/reader/)
 - [Adobe Flash Player \(version 17 or later\)](https://get.adobe.com/flashplayer/)
 - [Adobe Shockwave Player](https://get.adobe.com/shockwave/)
 - [Apple Quick Time](http://www.apple.com/quicktime/download/)
- At a minimum, you must have Microsoft Office 2013, 2010, 2007 or Open Office. Microsoft Office is the standard office productivity software utilized by faculty, students, and staff. Microsoft Word is the standard word processing software, Microsoft Excel is the standard spreadsheet software, and Microsoft PowerPoint is the standard presentation software. Copying and pasting, along with attaching/uploading documents for assignment submission, will also be required. If you do not have Microsoft Office, you can check with the bookstore to see if they have any student copies.

ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu.

Note: Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

COMMUNICATION AND SUPPORT

Brightspace Support

Need Help?

Student Support

If you have any questions or are having difficulties with the course material, please contact your Instructor.

Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778 or click on the **Live Chat** or click on the words "[click here](#)" to submit an issue via email.



System Maintenance

D2L runs monthly updates during the last week of the month, usually on Wednesday. The system should remain up during this time unless otherwise specified in an announcement. You may experience minimal impacts to performance and/or look and feel of the environment.

COMMUNICATION AND SUPPORT:

Preferred form of communication: Email
Communication response time: 48 hours

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Policies:

- Attendance/Lateness:** Students are expected to be present at all class lectures. The maximum number of excused absences allowed per semester will be 3. 3 or more absences will automatically result in F as course grade.
- Late Work:** Under no circumstances will the late work be accepted. If a student is absent from class on the due date of any assignment, they are expected to make alternative arrangements to assure that the assignment is turned in ON TIME. Credit will be given for ONLY those assignments, programs, and/or projects turned in no later than the deadline as announced by the instructor of this class.
- Missed Exams and Quizzes:** Missed exams and quizzes will result in 0 in all circumstances.
- Extra Credit:** No extra credit work will be given under any circumstances.
- Withdrawal:** Any student wishing to withdraw from the course must do so officially as outlined in the class schedule. THE INSTRUCTOR CANNOT DROP OR WITHDRAW ANY STUDENT.

Syllabus Change Policy:

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

UNIVERSITY SPECIFIC PROCEDURES**Student Conduct:**

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the Student Guidebook.

<http://www.tamuc.edu/admissions/registrar/documents/studentGuidebook.pdf> Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum: Netiquette
<http://www.albion.com/netiquette/corerules.html>

TAMUC Attendance:

For more information about the attendance policy please visit the Attendance webpage and Procedure 13.99.99.R0.01.

<http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx>
<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf>

Academic Integrity:

Students at Texas A&M University-Commerce are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:

Undergraduate Academic Dishonesty 13.99.99.R0.03

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf>

Graduate Student Academic Dishonesty 13.99.99.R0.10

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/graduate/13.99.99.R0.10GraduateStudentAcademicDishonesty.pdf>

ADA STATEMENT**Students with Disabilities:**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services:

Texas A&M University-Commerce

Gee Library- Room 162

Phone (903) 886-5150 or (903) 886-5835

Fax (903) 468-8148

Email: studentdisabilityservices@tamuc.edu

Website: [Office of Student Disability Resources and Services](http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/)

<http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/>

Nondiscrimination Notice:

Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

Campus Concealed Carry Statement:

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the [Carrying Concealed Handguns On Campus](#) document and/or consult your event organizer.

Web url:

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf>

Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903- 886-5868 or 9-1-1.

Smoke, Vapor & Tobacco Free Environment:

University Procedure 34.05.99.R1 now prohibits the use of vapor/electronic cigarettes, smokeless tobacco, snuff and chewing tobacco inside and adjacent to any building owned, leased, or operated by A&M – Commerce.

Course Outline/Calendar:

WEEKS	SUBJECTS TO BE COVERED
1	Chapters 1 (Introduction to Automata Theory) -Automata Theory
2	Chapters 2 & 3 (Languages and Recursive Definitions) -Languages -Kleene Closure -Terminology -Recursive Definition -Arithmetic Expression
3	Chapters 4 (Regular Expressions) -Regular Expressions -Regular Languages -EVEN-EVEN
4	Chapter 5 (Finite Automata) -Definitions of Finite Automata -Examples of Finite Automata -EVEN-EVEN revisited

The syllabus/schedule are subject to change.

5	Chapter 6 & 8 (TG and FA with Output) -Transition Graph (Definition) -Transition Graph vs. Finite Automata -Moore Machine and Mealy Machine -Moore Machine = Mealy Machine
6	Chapter 7 (Kleene's Theorem) -Kleene's Theorem -TG to Regular Expression -Regular Expression to FA -Nondeterministic FA -NFA and Kleene's Theorem
7	Chapter 9 & 10 (Regular and Non-regular Languages) -Closure Properties (Union, Intersection, Kleene Star) -Complements and Intersections (Closure Properties) -Pumping Lemma -Quotient Languages
8	Midterm Exam -Chapters 1-10
9	Chapter 12 (Context Free Grammars) -Grammars, Context Free Grammars -Ambiguity -Total Language Trees -Syntax Trees, Generation Trees, Parse Trees, Production Trees, Derivation Trees
10	Chapters 13 & 16 (Non-context Free Languages) -Chomsky Normal Form -Regular Grammars -Pumping Lemma for CFLs
11	CKY Parsing and Parser -Parser Project
12	Chapter 14 (Pushdown Automata) -Pushdown Automata -Applications of PDA
13	Chapter 17 (Context Free Languages) -Closure Properties -Intersection and Complement -Context Free Languages vs. Regular Languages
14	Chapters 19 & 20 (Turing and Post Machines) -Turing Machine
15	Final Exam (Comprehensive with focus on Chapters 12-20)
16	Project Demos and Presentations
