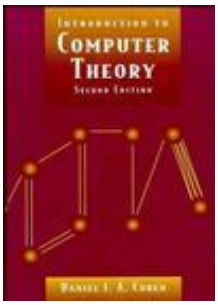
Texas A&M University - Commerce

Tentative Course Syllabus



CSCI549-001

AUTOMATA THEORY

Spring, 2013

Department of Computer Science
College of Arts and Sciences

Class Meetings: Thursdays 2:00PM-4:40PM (Classroom: HL306)

Instructor:

Dr. S. Suh, Professor & Head, Department of Computer Science
Texas A&M University - Commerce
Office: Jour 123; Phone: 903.468.8199; E-mail: sang.suh@tamuc.edu

Textbook:

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 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

Students with Disabilities Act Compliance:

Students requesting accommodations for disabilities must go through the Academic Support Committee. For more information, please contact the Director of Disability Resources & Services, Halladay Student Services Bldg., Room 303D, (903) 886-5835

Academic Ethics:

"All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment." (See Student's Guide Handbook, Policies and Procedures, Conduct).

Attendance Policy:

Students are expected to be present at all class lectures. 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. 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.

Course Requirement Deadlines:

Credit will be given for ONLY those exam(s), program(s), and/or project(s) turned in no later than the deadline(s) as announced by the instructor of this class unless prior arrangement has been made with the instructor.

Method of Evaluation (*Tentative*):

Two/Three Tests	(70%, in class - closed book – 25/45 or 15/15/40)
Quizzes and Participation	(10%)
Implementation Project	(20%)

Course Outline:

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
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) -Kleen'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 Midterm Exam -Chapters 1-10
8	Chapter 12 (Context Free Grammars) -Grammars, Context Free Grammars -Ambiguity -Total Language Trees -Syntax Trees, Generation Trees, Parse Trees, Production Trees, Derivation Trees
9	LR(1) Parser -Parser Project
10	Chapter 14 (Pushdown Automata) -Pushdown Automata -Applications of PDA
11	Chapters 13 & 16 (Non-context Free Languages) -Chomksy Normal Form -Regular Grammars -Pumping Lemma for CFLs
12	Chapter 17 (Context Free Languages) -Closure Properties -Intersection and Complement -Context Free Languages vs. Regular Languages
13	Chapters 19 & 20 (Turing and Post Machines) -Turing Machine
14	Final Exam and Project Demos
15	Reserved for Project Demos and Makeups

- **LITERATURE SEARCH AND RESEARCH ASSISTANCE:**

For research assistance, please contact:
John Atabaev, Reference Librarian: Sciences & Collection Development
John.Atabaev@tamuc.edu
903-886-5726

STUDENTS REQUIRING ASSISTANCE: **Requests from students with disabilities for reasonable accommodations Office of Disability Resources, Halladay Student Services Building, Room 303D, 903-886-5835.**