CSCE 4115 Formal Languages, Automata, and Computability
Syllabus: Fall 2020

Instructor: Bill Buckles
Office: NTDP F275 (CSE Dept.)
Office hours: Tuesday 4:30-5:30pm
                Friday 3:30-5:00pm
Phone: 940-565-4869

Semester: Fall 2020
Time: 10:00am 11:20am Tue and Th
Place: NTRP K120
Email: bill.buckles@unt.edu

Teaching Assistants

NAME	OFFICE HOURS	EMAIL	ZOOM ADDRESS
Narahari, Akhil Kumar (CSCE 4115)	Tuesday 2:00-3:00pm Thursday 2:00-3:00pm	AkhilKumarNarahari@my.unt.edu	https://unt.zoom.us/j/98719098387
Solanki, Pururajsinh (CSCE 4115)	Monday 1-2pm Wednesday 1-2pm	PururajsinhHarendrasinhSolanki@my.unt.edu	https://unt.zoom.us/j/94544726204
B. Buckles	Tuesday 4:30-5:30pm Friday 3:30-5:00pm	bill.buckles@unt.edu	https://unt.zoom.us/j/92618242604

Textbook

Introduction to the Theory of Computation, 3e, Michael Sipser, Sengage Learning, 2013, Boston, ISBN-13-978-1-133-18779-0 [Chapters 0-5 and 7]

(not required) *Introduction to Automata Theory, Languages, and Computation,* 3rd Ed., John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman, Pearson, 2007, ISBN 0-321-45536-3

Course Description
Introduction to formal language theory that underlies modern computer science. Topics include different representational forms for regular languages, context-free grammars, pushdown automata, pumping lemmas for regular and context-free languages, and Chomsky's hierarchy.

Learning Outcomes

By the end of the course you will

- Convert a regular expression to an equivalent NFA or DFA.
- Apply the pumping lemma for regular languages to prove that a given non-regular language is, in fact not regular.
- Apply the pumping lemma for context-free languages to prove that, given a grammar, G, that is not context-free that G, in fact, is not context-free.
- Prove that any context-free grammar, G, can be converted to a pushdown automata that accepts the same language as G.

- Describe the concept of undecidability, give an example of an undecidable language, UL, and prove that UL is undecidable.
- Demonstrate that a "real" computer can be simulated by a Turing machine.
- Demonstrate the concept of NP-completeness, give an example of an NP-complete problem, NPCP, and prove that NPCP is NP-complete.

Course outcomes are measurable achievements to be accomplished by the completion of a course. These outcomes are evaluated as part of our ABET accreditation process.

Course Requirements
Attendance: While, due to administrative overhead, attendance will not be routinely assessed, it is mandatory.

Grading:

Midterm 30% [~Week 8]

Homework 30% (see Note below)

Quizzes 10% (see Note below)

Final 30%

NOTE: The homework portion of the grade will be instantiated via approximately seven homework assignments of which the lowest grade will be dropped prior to averaging. For each homework, a group of at most three may collaborate. Group members will be assigned (not self-selected) and group memberships will occasionally be changed. Late homework submissions will be accessed a penalty of 5 points per day including weekends. No submission will be accepted more than one week after the due date.

Quizzes will be announced in advance and will be performed in class. Each submission will be an individual (not group) effort.

Policy for working in groups.
When working in groups, you can distribute the work among group members. However, each name is on the submission is responsible for the submission. This means
(i)   You should be able to explain the algorithm/code/logic of the solution for all parts of the project even if you were not directly involved in implementing it
(ii)   If any group member cheats, the entire group will be penalized
For the first few assignments, the groups will be selected by the instructor. Later in the semester you can switch, merge or create new groups. The only constraint is that there can be no more than 4 people per group.

Prerequisites: CSCE 2100 and CSCE 2110 (Computing Foundations I; Computing Foundations II)

Academic Integrity
Standards in this course are consistent with UNT policy: STUDENT STANDARDS OF ACADEMIC INTEGRITY

(18.1.16), or other related/existing UNT polices. The work that you turn in to be graded, including any underlying ideas, must be your own individual work. Usage of unauthorized material and sources, or depending on any unauthorized assistance, to answer homework problems, test questions, writing reports, or carrying any type of assignment, etc., without the permission of the instructor, or without complete and accurate and complete attribution/citation of the source, when applicable, is viewed as an academic misconduct.

Cheating policy:

- **You can use any publicly available resource, including code snippets, so long as you cite the source. You cannot use resources from sites that you or others have to pay to access (such as Chegg etc.)**
- **Not citing the source is CHEATING**
- **Using information from a homework helper site is CHEATING**
- **Duplicating/nearly duplication answers from another student/another groups submission is CHEATING**
- **First Offence: 0 for the entire submission**
- **Second Offence: F for the course**

Disabilities Accommodation:

The University of North Texas complies with Section 504 of the 1973 Rehabilitation Act and with the Americans with Disabilities Act of 1990. The University of North Texas provides academic adjustments and auxiliary aids to individuals with disabilities, as defined under the law. 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 believe you have a disability requiring accommodation, please see the instructor and/or contact the Office of Disability Accommodation at 940-565-4323 during the first week of class.