University of Windsor – School of Computer Science
COMP-3540-01 – Theory of Computation
Fall 2020

Instructor: Dr. Luis Rueda
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Email: lrueda@uwindsor.ca
Office hours: Tue 11:00am-12:00pm (on Blackboard)
Wed 10:30am-12:30pm (on Blackboard)
Fri 9:00am-11:00am (on Blackboard)

Lectures: Tues/Thurs 1:00pm-2:20pm. Room: on Blackboard

Course Web page: Blackboard site

GA: Majid Joseph (joseph14@uwindsor.ca)

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Prerequisites

COMP-2140, COMP-2310 and COMP-2540

Course Topics

Finite Automata, regular expressions and languages; properties of regular languages; context-free grammars and languages; pushdown automata; properties of context-free languages. Introduction to Turing machines; recursive functions; undecidability.

Study material:
- Textbook: it is the basis for all course content
- Course slides: posted on course Web site
- In-class notes: may not be posted or recorded

Textbook:
- Introduction to Automata Theory, Languages and Computation, 3rd Ed., J. Hopcroft, R. Motwani, J. Ullman, 2006

Other useful books:
- Introducing the Theory of Computation, W. Goddard, 2009
- Introduction to the Theory of Computation, M. Sipser, 2012
- Computers and Intractability, M. Garey, D. Johnson, 1979
- Introduction to Algorithms, 3rd. Ed, T. Cormen et al., MIT Press, 2009
- Algorithms, 4th Edition, by R. Sedgewick, Addison-Wesley, 2011

Evaluation scheme

5 Assignments	35% (7% each)
2 Quizzes	30% (15% each)
1 Final Project	35%

Deadlines/Dates (tentative)

> Quizzes: Oct 20, Nov 26
> Project due: At least 2 weeks after announcement (tentatively Dec 13)

Grades

A numeric (integer-valued) final grade out of 100 will be assigned to each student based on the evaluation scheme given above. Non-integer values will be rounded to the nearest integer. Students need a grade of 50 or more to pass the course. Check the Senate Bylaw 54 for more information.

SET

Student Evaluation of Teaching forms will be administered in the last two weeks of classes, in accordance with Senate policy.

Tentative Class Schedule

Date	Topic
Sep. 10	Introduction – Alphabets and Languages
Sep. 15	Finite Automata
Sep. 17	Deterministic Finite Automata
Sep. 22	Nondeterministic Finite Automata
Sep. 27	Regular Expressions
Sep. 29	Properties of Regular Languages
Oct. 1	Pumping Lemma – Minimization
Oct. 6	Closure Properties of Regular Languages
Oct. 8	Context-free Grammars
Oct. 20	*Quiz 1*
Oct. 22	Parsing and Ambiguity
Oct. 27	Normal Forms
Oct. 29	Pushdown Automata
Nov. 3	Equivalence of PDA and CFG
Nov. 5	Pumping Lemma for CFG
Nov. 10	Properties of CFL
Nov. 12	Undecidability – Recursive Languages
Nov. 17	Turing Machines
Nov. 19	Nondeterministic Turing Machines
Nov. 24	Extensions of Turing Machines
Nov. 26	*Quiz 2*
Dec. 1	Undecidable Problems and Languages
Dec. 3	Undecidable Problems and Languages
Dec. 8	Undecidability – Reduction

Resources

- Algorithms by Sedgewick, examples and source code: http://algs4.cs.princeton.edu/home/, http://algs4.cs.princeton.edu/code/
- Java Regex documentation: http://docs.oracle.com/javase/8/docs/api/java/util/regex/package-summary.html
- Tools for parsers and generators: http://catalog.compilertools.net/lexparse.html
- JFLAP: http://www.jflap.org/

Rules and Regulations

1. Midterms, quizzes and exams, which are missed for any reason whatsoever, cannot be made up.
2. In the **exceptional** case that a student misses a test for a **valid reason**, i.e., a medical reason, the mark for that test will be carried over to the next test or the final project, in sequence.
3. If a student is sick, s/he **must inform** the instructor about his/her illness **within 7 days** that s/he is not able to attend the exam/test/assignment.
4. If a student has a medical condition, which may create problems during the term, s/he must inform the instructor in writing with supporting documents before the last day of classes. No consideration will be made afterwards, except for the final project.
5. No extensions to assignments, presentation or project will be allowed, and no make-ups will be considered. If a student misses an assignment, for a valid reason, the corresponding mark will be carried over to the next assignment(s) or final project, in sequence.
6. If a student is caught adopting unfair means (i.e., plagiarism), that student will face **serious consequences** including official disciplinary procedures (see below).
7. Informal reviews and appeals of the marks for assignments, midterm, exams and/or projects will be considered only if requested **within 10 days** after the release of the corresponding grades. After the 10-day period students will have to submit a formal appeal if they wish. See Senate Bylaw 54 for more details on appealing about grades.

Academic Integrity

The instructor will put a great deal of effort into helping students to understand and learn the material in the course. However, the instructor will not tolerate any form of plagiarism. The instructor will report any suspicion of cheating to the Director of the School of Computer Science. If sufficient evidence is available, the Director will begin a formal process according to the University Senate Bylaws. The instructor will not negotiate with students who are accused of cheating but will pass all information to the Director of the School of Computer Science.
The following behaviour will be regarded as cheating:

- Copying assignments or quizzes or presenting someone else's work as your own
- Allowing another student to copy an assignment/project from you and present it as their own work
- Copying from another student during a test or exam
- Referring to notes, textbooks, etc., during a test or exam (unless otherwise stated)
- Talking during a test or exam
- Not sitting at the pre-assigned seat during a test or exam
- Communicating with another student in any way during a test or exam
- Having access to the exam/test paper prior to the exam/test
- Explicitly asking a proctor for the answer to a question during an exam/test
- Modifying answers after they have been marked
- Any other behaviour which attempts unfairly to give you some advantage over other students during the grade-assessment process
- Refusing to obey the instructions of the officer in charge of an examination

The list given above is not exhaustive. More examples are given in Appendices of [Senate Bylaw 31](). Complete guidelines and procedures on the sanctions imposed by the university are also listed in Table A.1 of the [Senate Bylaw 31]().

Several University of Windsor students have been caught cheating during the last few years. In most cases the evidence was sufficient to invoke a disciplinary process which resulted in various forms of punishment including letters of censure, loss of marks, failing grades, and expulsions. As an example, a student who copied a project from another student and presented it as his own was expelled from the university. Another student who was caught copying in a midterm was suspended for one year. Do not cheat, if you are caught and found guilty, you could be expelled from the university and will have to explain why when you search for a job.

Plagiarism Detection Software

Plagiarism-detection software SafeAssign will be used for all student assignments in this course. You will be advised how to submit your assignments. Note that students' assignments that are submitted to the plagiarism-detection software become part of the database. This assists in protecting your intellectual property. However, you also have the right to request that your assignment(s) not be run through the student assignments database. If you choose to do so, that request must be communicated to the course instructor in writing at the beginning of the course.

Academic Accommodations for Students with Disabilities

Students with disabilities who require academic accommodations in this course must contact an Advisor in Student Disability Services (SDS) to complete SDS Registration and receive the necessary Letters of Accommodation. After registering with Student Disability Services, you must present your Letter of Accommodation and discuss your needs with the course instructor as early in the term as possible. Please note that deadlines for the submission of documentation and completed forms to Student Disability Services are available on their website: http://www.uwindsor.ca/studentaccessibility/

Intellectual Property

Lectures and course materials prepared by the instructor are considered by the University to be an instructor's intellectual property covered by the Copyright Act, RSC 1985, c C-42. Course materials such as PowerPoint slides and lecture recordings are made available to you for your own study purposes. These materials cannot be shared outside of the class or "published" in any way. Posting recordings or slides to other websites without the express permission of the instructor will constitute copyright infringement.

Exam Content Confidentiality

Examinations, midterms, assignments and projects given in this course are protected by copyright. Reproduction or dissemination of examinations or the contents or format of examinations/midterms in any manner whatsoever (e.g., sharing content with other students), without explicit permission of the course instructor, is strictly prohibited.

Recording of Lectures

Lectures and discussions can be recorded by requesting explicit permission from the instructor. Students planning to do so shall send a request (via email is sufficient) before the lecture is delivered. Students, however, are not allowed to post or share any recorded material to any other individual or party outside of this course. See Senate Policy on recording lectures.

Feeling Overwhelmed?

From time to time, students face obstacles that can affect academic performance. If you experience difficulties and need help, it is important to reach out to someone. For help addressing mental or physical health concerns on campus, contact (519) 253-3000:

- Student Health Services at ext. 7002 (http://www.uwindsor.ca/studenthealthservices/)
- Student Counselling Centre at ext. 4616 (http://www.uwindsor.ca/studentcounselling/)-
- Peer Support Centre at ext. 4551

24 Hour Virtual Support is Available

- My Student Support Program (MySSP) is an immediate and fully confidential 24/7 mental health support that can be accessed for free through chat, online, and telephone. This service is available to all University of Windsor students and offered in over 30 languages. Call: 1-844-451-9700, visit https://keepmesafe.myissp.com/ or download the My SSP app:Apple App Store/Google Play.

A full list of on-and off-campus resources is available at http://www.uwindsor.ca/wellness. Should you need to request alternative accommodation contact your instructor, head or associate dean.

Important Dates for Fall 2020

Thursday September 10: First day of classes

Wednesday September 23: Last day for late registration for Fall classes (to add classes)

Wednesday October 7: Fall financial drop date

Saturday October 10 - Sunday October 18: Fall Reading Week – No classes

Monday October 12: Thanksgiving Day (Statutory Holiday – University closed

Wednesday November 18: Last day to voluntarily withdraw from Fall classes (to drop classes)

Wednesday December 9: Last day of classes

Friday December 11 – Tuesday December 22: Fall Final Exams

Wednesday December 23: Alternate Exam Day

Thursday December 24 – Friday January 1: University offices closed for December Holiday recess