University of Windsor – School of Computer Science
60-254: Data Structures and Algorithms – Winter 2017

Lectures: M W 1:00pm – 2:20pm (ER 1118)
Instructor: Dr. Luis Rueda (room LT 8110, Ext. 3002, lrueda@uwindsor.ca)
Office hours: M W 2:30pm – 3:30pm

Labs: Sec. 51: M 4:00pm – 5:20pm (Room ER 3119)
Sec. 52: W 5:00pm – 5:20pm (Room ER 3119)

Course web page:
Available at Blackboard website.

Prerequisites:
60-100 and 60-141.

Course Goals
An introduction to the programming and analysis of linear and non-linear internal (main store) data structures and associated algorithms. Topics include the formal notion of an algorithm, elementary time and space complexity; linear lists (such as stacks, queues, linked structures.); non-linear lists (trees, binary trees); recursion; sorting techniques (such as heap sort, quick sort, merge sort, shell sort.); searching techniques (such as binary search, binary search trees, red-black trees, hashing.); algorithm design paradigms (such as divide-and-conquer, dynamic programming, greedy algorithms); and applications.

Learning Outcomes
At the end of the course, the successful student will know and be able to:
- Define and explain the notion of an algorithm
- Explain what is meant by an efficient algorithm
- Analyze the time-complexity of an algorithm
- Discuss and assess a research paper of moderate difficulty in the area of algorithm design
- Prepare a small research project
- Reproduce and apply tools in the form of design paradigms and data structures for designing efficient algorithms
- Analyze a problem and draw upon appropriate tools to solve real problems
- Formulate ingenious ways of solving problems
- Use algorithms learnt in lectures in lab sessions to solve interesting problems
- Apply concepts and choose appropriate techniques to specific problem domains
- Design improved and beautiful algorithms
- Formulate ingenious ways of solving problems

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

Textbook:

Data Structures and Algorithms in Java, 6th Edition, by M. Goodrich and R. Tamassia, Wiley, 2014.

Other useful books:
- ➢ Algorithm Design and Applications by M. Goodrich and R. Tamassia, Wiley, 2015.
- ➢ *Data Structures and Algorithm Analysis in Java, 3rd Edition,* Mark Allen Weiss, Addison-Wesley, 2012.
- ➢ *Introduction to Algorithms*, 3rd. Edition, by Thomas Cormen et al., MIT Press, 2009.
- ➢ *Algorithm Design*, by Jon Kleinberg and Eva Tardos, Addison Wesley, 2005.

Evaluation scheme:

5 Lab Assignments	25% (5% each)
1 Midterm	28%
1 Final Exam	47%

Exam dates (tentative):

Midterm: Monday March 1, 1:00pm – 2:20pm
Lab assignments: Jan 23-25, Feb 6-8, Feb 27-Mar 1, Mar 13-15, Mar 27-29
Final: Tuesday April 11, 12:00pm (Slot 10), room: TBA

Labs
- Attending all labs is required (all students must register in either section 51 or 52).
- Lab assignments must be submitted and marked during the labs. No assignments will be accepted by email or other means.
- Labs will run on Mon (Sec 51) and Wed (Sec 52), will start on Jan 16, and will finish on March 29.
- There will be 10 lab sessions. In each odd-numbered lab session (1, 3, 5, 7 and 9), the lab assignment will be explained, and students will start working on it.
- Lab assignments will be submitted in even-numbered lab sessions (2, 4, 6, 8 and 10). Each lab assignment is worth 5% of the course grade. If you finish earlier, namely in the corresponding odd-numbered session, you can submit the lab at that time and do not have to come to the next session (the corresponding even-numbered lab).
- The preferred programming language is Java. However, you can use a programming language of your choice, provided you complete the required tasks correctly.

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. A final grade below 50 will be considered as a failure. More information is available at: http://www.uwindsor.ca/secretariat/sites/uwindsor.ca.secretariat/files/grading_and_averages.pdf

Note: Grade curving may be applied.

Tentative Class Schedule

Week	Dates	Topics
1	Jan. 9 – Jan. 11	Introduction - Algorithm Analysis
2	Jan. 16 – Jan. 18	Algorithm Analysis – Stacks
3	Jan. 23 – Jan. 25	Queues – Linked Lists
4	Jan. 30 – Feb. 1	Recursion
5	Feb. 6 – Feb. 8	Priority queues – Sorting
6	Feb. 13 – Feb. 15	Sorting
	Feb. 18 – Feb. 26	Study week
7	Feb. 27 – Mar. 1	Sorting – Trees - Midterm
8	Mar. 6 – Mar. 8	Midterm - Heap sort
9	Mar. 13 – Mar. 15	Divide and conquer - Hash tables
10	Mar. 20 – Mar. 22	Binary search trees
11	Mar. 27 – Mar. 29	AVL trees - Red-black trees
12	Apr. 3 – Apr. 5	Dynamic programming – Greedy approaches

Course Regulations

1. No student is allowed to take a course more than twice without permission from the Associate Dean.
2. Midterm tests, which are missed for any reason whatsoever, cannot be made up.
3. In the **exceptional** case that a student misses a midterm test for a **valid reason**, i.e. supported by **appropriate documentation** (see below), the mark for that test will be carried over to the final. In case of a Doctor's note, the student must submit a Student Medical Certificate signed by a Medical Doctor and the note **must** specifically state that the student was incapable of writing the exam on the day of the test.
4. If the final exam is missed (for a valid reason), a makeup exam will be arranged. The makeup will be scheduled either at the end of the winter term or along with the final exam of the subsequent offering of the course (i.e., intersession term).
5. If a student is sick, s/he **must inform** the instructor about his/her illness **within 7 days**, and with a supporting doctor's note which clearly states s/he is not able to attend the exam/test/assignment.
6. If a student has a medical condition, which may cause 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 exam.
7. No extensions to the labs will be allowed, and no make-ups will be considered. If a student misses a lab assignment, the corresponding mark will be carried over to the next lab(s) or final exam accordingly.
8. If a student is caught adopting unfair means (e.g. plagiarism), that student will face **serious consequences** including official disciplinary procedures (see policies below).

Policy on Misconduct

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 cheating. 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 (this list is not exhaustive – more examples in Appendix A, Senate Bylaws 31:

- Copying assignments or labs 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

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.

Exam Content Confidentiality

Examinations, quizzes, assignments and projects given in this course are protected by copyright. Reproduction or dissemination of examinations or the contents or format of examinations/quizzes in any manner whatsoever (e.g., sharing content with other students), without the express permission of the instructor, is strictly prohibited. Students who violate this rule or engage in any other form of academic dishonesty will be subject to disciplinary action under Senate Bylaw 31: Student Affairs and Integrity.