THE UNIVERSITY OF WINNIPEG

APPLIED COMPUTER SCIENCE

Course Number: ACS-2947-002, 072L, 073L
Course Name: Data Structures and Algorithms
Course Webpage: Nexus (https://nexus.uwinnipeg.ca/d2l/home/58546)

Instructor Information

Instructor: Dr. Mary Adedayo
E-mail: m.adedayo@uwinnipeg.ca
Office: 3D19
Office Hours: Mondays   2:30 pm – 3:30 pm   3D19

Class meeting time: Mondays/Wednesdays   1:00 pm – 2:15 pm   3D01
Lab time: L-072   Thursdays   4:00 pm – 5:15 pm   3C13
    L-073   Fridays   4:00 pm – 5:15 pm   3C13

Important Dates

1. First Class: Monday, January 8, 2024
2. First Lab: 072L: Thursday, January 11, 2024
                                                                        073L: Friday, January 12, 2024
3. Midterm Test: **Monday, February 12, 2024**
4. Reading Week (no classes):   February 18 – 24, 2024
5. Final Withdrawal Date w/o academic penalty*:   Friday, March 15, 2024
6. Last Class: Wednesday, April 3, 2024
7. Last Lab: 072L: Thursday, April 4, 2024
                                                                        073L: Monday, April 8, 2024
8. Final Exam: *TBD*
9. University closures: Louis Riel Day   Monday, February 19, 2024
                              Good Friday   Friday, March 29, 2024
10. Make-up class for lab that falls on holiday closure: Monday, April 8, 2024

*A minimum of 20% of the work on which the final grade is based will be evaluated and available to the student before the voluntary withdrawal date.

Course Objectives / Learning Outcomes

This course introduces the theory, practice, and methods of data structures and algorithm design. Students will learn elementary data structures such as linked lists, stacks, queues, lists, trees, and maps in the Java language, and the algorithm for manipulating these data structures. The objective of this course is to introduce students to both data structures and algorithm design. The goal of the lecture is twofold: 1) to discuss different data structures to represent real-world problems and, 2) to study various ways to design algorithms to solve the problems. As an important part of the course, the Java programs that implement all the algorithms discussed will be analyzed and compared to develop deep knowledge of programming.

Evaluation Criteria

1. Labs (7%)
   - Based on the best 7 of 8 labs, equally weighted
   - Labs are to be completed during the scheduled lab period for each section
   - No late lab submissions will be accepted

2. Assignments (20%)
   - 4 assignments, worth 5% each
   - Individual due dates will be posted on Nexus
   - Assignments will be accepted up to 1 day late with a 20% penalty

   Course IDE:
   Various Java IDEs are available to install (e.g., NetBeans, IntelliJ, Visual Studio, and Eclipse). Students may choose to work with any IDE that they are comfortable with.

   Lab/assignment submissions:
   All work is to be submitted electronically via Nexus. All coding is to be submitted in .java format, and any written work is in PDF format. Further details and submission procedure will be stated in each assignment.

   Students are responsible for backing up and protecting their lab and assignment work.

3. Midterm Tests (25%)
   - During the regular class time (see Important Dates)

4. Final Exam (48%)
   - Cumulative

Test / Exam Requirements

- Photo ID is required for the midterm and final exams.
- The use of computers, calculators, phones, or other electronic devices is not permitted during exams.
- Midterm and final exams are closed-book.

Students should contact the instructor as soon as possible if extenuating circumstances require missing a lab, assignment, test, or examination. A medical certificate from a practicing physician may be required before any adjustments or makeup exams are considered.

Students with documented disabilities, temporary or chronic medical conditions, requiring academic accommodations for tests/exams (e.g., private space) or during lectures/laboratories (e.g., note-takers) are encouraged to contact Accessibility Services (AS) at 204-786-9771 or accessibilityservices@uwinnipeg.ca to discuss appropriate options. All information about a student's disability or medical condition remains confidential.
https://www.uwinnipeg.ca/accessibility-services.

Students may choose not to attend classes or write examinations on holy days of their religion, but they must notify their instructors at least two weeks in advance. Instructors will then provide the opportunity for students to make up work examinations without penalty. A list of religious holidays can be found in the 2019-20 Undergraduate Academic Calendar online at
http://uwinnipeg.ca/academics/calendar/docs/important-notes.pdf

Final Letter Grade Assignment

Historically, numerical percentages have been converted to letter grades using the following scale. However, instructors can deviate from these values based on pedagogical nuances of a particular class, and final grades are subject to approval by the Department Review Committee.

A+	90 – 100%	B+	75 – 79%	C	60 – 64%
A	85 – 89 %	B	70 – 74%	D	50 – 59%
A-	80 – 84%	C+	65 – 69%	F	below 50%

Required Textbook / Reading List

- M.T. Goodrich and R. Tamassia: *Data Structures and Algorithm in Java* (6th Edition), John Wiley & Sons, Inc., 2014. ISBN: 1118771338
- Class Notes/slides will be available on Nexus.

Prerequisite Information

- A grade of at least C in ACS-1904/3 or ACS-1905/3
- ACS-2947L (lab) must be taken concurrently

Regulations, Policies, and Academic Integrity

Students are encouraged to familiarize themselves with the Academic Regulations and Policies found in the University Academic Calendar at:
https://uwinnipeg.ca/academics/calendar/docs/regulationsandpolicies.pdf

Particular attention should be given to subsections 8 (Student Discipline), 9 (Senate Appeals), and 10 (Grade Appeals).

Avoiding Academic Misconduct: Academic dishonesty is a very serious offense and will be dealt with in accordance with the University's policies.

Detailed information can be found at the following:

- Academic Misconduct Policy and Procedures:
  https://www.uwinnipeg.ca/policies/docs/policies/academic-misconduct-policy.pdf and
  https://www.uwinnipeg.ca/policies/docs/procedures/academic-misconduct-procedures.pdf
- About Academic Integrity and Misconduct, Resources and FAQs:
  https://library.uwinnipeg.ca/use-the-library/help-with-research/academic-integrity.html

Uploading essays and other assignments to essay vendors or trader sites (filesharing sites that are known providers of essays for use by others who submit them to instructors as their own work) involves "aiding and abetting" plagiarism. Students who do this can be charged with Academic Misconduct.

Academic Integrity and AI Text-generating Tools: Students must follow principles of academic integrity (e.g., honesty, respect, fairness, and responsibility) in their use of material obtained through AI text-generating tools (e.g., ChatGPT, Bing, Notion AI). If an instructor prohibits the use of AI tools in a course, students may face an allegation of academic misconduct if using them to do assignments. If AI tools are permitted, students must cite them. According to the MLA (https://style.mla.org/citing-generative-ai/), writers should
  - cite a generative AI tool whenever you paraphrase, quote, or incorporate into your own work any content (whether text, image, data, or other) that was created by it
  - acknowledge all functional uses of the tool (like editing your prose or translating words) in a note, your text, or another suitable location
  - take care to vet the secondary sources it cites

If students are not sure whether or not they can use AI tools, they should ask their professors.

Non-academic misconduct: Students are expected to conduct themselves in a respectful manner on campus and in the learning environment irrespective of platform being used. Behaviour, communication, or acts that are inconsistent with a number of UW policies could be considered "non-academic" misconduct. More detailed information can be found here:

- Respectful Working and Learning Environment Policy
  https://www.uwinnipeg.ca/respect/respect-policy.html,
- Acceptable Use of Information Technology Policy
- https://www.uwinnipeg.ca/policies/docs/policies/acceptable-use-of-information-technology-policy.pdf
- Non-Academic Misconduct Policy and Procedures:
  https://www.uwinnipeg.ca/policies/docs/policies/student-non-academic-misconduct-policy.pdf and https://www.uwinnipeg.ca/policies/docs/procedures/student-non-academic-misconduct-procedures.pdf

Copyright and Intellectual Property: Course materials are the property of the instructor who developed them. Examples of such materials are course outlines, assignment descriptions, lecture notes, test questions, and presentation slides—irrespective of format. Students who upload these materials to filesharing sites, or in any other way share these materials with others outside the class without prior permission of the instructor/presenter, are in violation of copyright law and University policy. Students must also seek prior permission of the instructor/presenter before, for example, photographing, recording, or taking screenshots of slides, presentations, lectures, and notes on the board. Students found to be in violation of an instructor's intellectual property rights could face serious consequences pursuant to the Academic Misconduct or Non-Academic Misconduct Policy; such consequences could possibly involve legal sanction under the Copyright Policy: https://copyright.uwinnipeg.ca/basics/copyright-policy.html

Privacy

Students have rights in relation to the collecting of personal data from the University of Winnipeg
- Student Privacy: https://www.uwinnipeg.ca/privacy/admissions-privacy-notice.html
- Zoom Privacy: https://www.uwinnipeg.ca/privacy/zoom-privacy-notice.html

Class Cancellation, Correspondence with Students, and Withdrawing from Course

When it is necessary to cancel a class due to exceptional circumstances, the course instructor will make every effort to inform students via UWinnipeg email and Nexus. Emails to the instructor must be sent to the direct UWinnipeg email address (not via the Nexus messaging tool).

Students are reminded that they have a responsibility to regularly check their UWinnipeg e-mail addresses to ensure timely receipt of correspondence from the University and/or the course instructor*.*

Please let the course instructor know if you plan on withdrawing from the course. Note that withdrawing before the VW date does not necessarily result in a fee refund.

Topics to be covered (tentative)

1. Object-oriented design (review)
2. Arrays
3. Linked lists
4. Big-O notation
5. Recursion (review)
6. Stacks
7. Queues
8. Deques
9. Array lists
10. Positional lists
11. Iterators
12. Trees
13. Binary trees

14. Priority queues
15. Heaps
16. Maps
17. Hash tables
18. Sorting
19. Graphs (time permitting)

Topics may be covered in a different order.

Note: A permitted or necessary change in the mode of delivery may require adjustments to important aspects of course outlines, like class schedule and the number, nature, and weighting of assignments and/or exams.