



# 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/50618>)

### Instructor Information

**Instructor:** Dr. Mary Adedayo  
**Office:** 3D19  
**E-mail:** [m.adedayo@uwinnipeg.ca](mailto:m.adedayo@uwinnipeg.ca)  
**Office Hours:** Mondays 11:30 am – 12:30 pm  
**Class meeting time:** Mondays/Wednesdays 10:00 am – 11:15 am 3D01  
**Lab time:** L-072 Mondays 4:00 pm – 5:15 pm 3C13  
L-073 Tuesdays 4:00 pm – 5:15 pm 3C13

### Important Dates

1. First Class: Wednesday, January 4, 2023
2. First Lab: 072L: Monday, January 9, 2023  
073L: Tuesday, January 10, 2023
3. Midterm Test 1: Monday, January 30, 2023
4. Week with recorded lectures (no in-person lecture)\*: February 12 – 18, 2023
5. Reading Week (no classes): February 19 – 25, 2023
6. Midterm Test 2: Monday, March 6, 2023
7. Final Withdrawal Date w/o academic penalty\*\*\*: Tuesday, March 14, 2023
8. Last Class: Monday, April 3, 2023
9. Last Lab: 072L: Monday, April 3, 2023  
073L: Tuesday, April 4, 2023
10. Final Exam (Comprehensive): TBD
11. University closures: Louis Riel Day Monday, February 20, 2023  
Good Friday Friday, April 7, 2023

\*Lectures for this week will be delivered via pre-recorded videos, not in-person. Lab sections for the week will however take place in-person.

\*\*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 and, practice and methods of data structures and algorithm design. Student 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 algorithm discussed will be analyzed and compared to develop deep knowledge on programming.

### **Evaluation Criteria**

#### 1. Labs (6%)

- Based on best 6 of 7 labs, evenly weighted
- Labs are to be completed during the scheduled lab period for each lab section
- No late lab submissions will be accepted

#### 2. Assignments (24%)

- 4 assignments, worth 6% 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). Student 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 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 (30%)

- 2 Tests, equally weighted
- During the regular class time (see Important Dates)

#### 4. Final Exam (40%)

- Cumulative

*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 are considered.*

### **Test / Exam Requirements**

- Exams will be delivered in person.
- 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 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](mailto: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 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

### **Student Wellness**

The University of Winnipeg affirms the importance of student mental health and our commitment to providing accessible, culturally appropriate, and effective services for students. Students who are seeking mental health supports are encouraged to reach out to the Wellness Centre at [studentwellness@uwinnipeg.ca](mailto:studentwellness@uwinnipeg.ca) or 204.988.7611. For community-based mental health resources and supports, students are encouraged to dial 2-1-1. This program of United Way is available 24/7 in 150 languages.

### **Regulations, Policies, and Academic Integrity**

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

*Avoiding Academic Misconduct:* 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). Please note, in particular, the subsection of Student Discipline pertaining to plagiarism and other forms of cheating.

Detailed information can be found at the following:

- Academic Misconduct Policy and Procedures: <https://www.uwinnipeg.ca/institutional-analysis/docs/policies/academic-misconduct-policy.pdf> and <https://www.uwinnipeg.ca/institutional-analysis/docs/policies/academic-misconduct-procedures.pdf>
- UW Library video tutorial “Avoiding Plagiarism” <https://www.youtube.com/watch?v=UvFdxRU9a8g>

Uploading essays and other assignments to essay vendor 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.

*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/institutional-analysis/docs/policies/acceptable-use-of-information-technology-policy.pdf>
- Non-Academic Misconduct Policy and Procedures: <https://www.uwinnipeg.ca/institutional-analysis/docs/student-non-academic-misconduct-policy.pdf> and <https://www.uwinnipeg.ca/institutional-analysis/docs/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/docs/copyright\\_policy\\_2017.pdf](https://copyright.uwinnipeg.ca/docs/copyright_policy_2017.pdf)

### **Privacy**

Students have rights in relation of the collecting of personal data the University of Winnipeg: <https://www.uwinnipeg.ca/privacy/admissions-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.

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 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. Java basics / review
2. Object oriented design
3. Arrays
4. Linked lists
5. Big-O notation
6. Recursion
7. Stacks
8. Queues
9. Deques
10. Array lists
11. Positional lists
12. Iterators
13. Trees
14. Binary trees
15. Priority queues
16. Heaps
17. Maps
18. Hash tables
19. Sorting
20. Graphs (time permitting)

*Topics may be covered in a different order.*

*Note: A permitted or necessary change in 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.*