



UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
COURSE OUTLINE

1. **Course:** CPSC 319: Data Structures, Algorithms, and Their Applications

Lecture Sections:

L01, MWF 13:00-13:50, Leonard Manzara, ICT 703, 220-3518, lcmanzar@ucalgary.ca

Office Hours: MWF 10:00-11:00

Course Website: D2L

Computer Science Department Office, ICT 602, 220-6015, cpsc@cpsc.ucalgary.ca

2. **Prerequisites:** One of CPSC 219, 233, 235 or ENCM 339

(<http://www.ucalgary.ca/pubs/calendar/current/computer-science.html#3620>)

3. **Grading:** The University policy on grading and related matters is described in sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Assignments	30%
Midterm Exam	30%
<i>(In-Class Monday March 6th, 2017)</i>	
Final Exam	40%

This course **will** have a Registrar's Scheduled Final Exam.

Special Regulations affecting Final grade: Each of the above components will be given a percentage grade. The final grade will be calculated using the weights above and then converted to a final letter grade using the attached table. To achieve an overall grade of C- or better in the course, you must achieve a minimum grade of C- in the final exam and complete all assignments.

4. **Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar. Section 3.6. It is the student's responsibility to familiarize themselves with these regulations. See also Section E.6 of the University calendar.
5. **Scheduled Out-of-Class Activities:** REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME ACTIVITY. If you have a clash with this out-of-class activity, please inform your instructor as soon as possible so that alternative arrangements can be made.
6. **Course Materials:**
Data Structures and Algorithms in Java, Adam Drozdek, Thomson Course Technology

Online Course Components:
None.
7. **Examination Policy:** Closed book. Students should also read the Calendar, Section G, on examinations.
8. **Approved Mandatory and Optional Course Supplemental Fees:** None.
9. **Writing across the Curriculum Statement:** In this course, the quality of the student's writing in the weighted components of the course will be a factor in the evaluation of these components. See also Section E.2 of the University Calendar.

10. **Human Studies Statement:** Students will be expected to participate as subjects or participants in projects. See also Section E.5 of the University Calendar.

11. **OTHER IMPORTANT INFORMATION FOR STUDENTS:**

- a) **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offense that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K, Student Misconduct to inform yourself of definitions, processes and penalties.
- b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points which can be found in each classroom and building.
- c) **Student Accommodations:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf. Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Computer Science.
- d) **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 403-220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also <http://www.ucalgary.ca/secretariat/privacy>
- f) **Student Union Information:** VP Academic (403) 220-3911 suvpaca@ucalgary.ca SU Faculty Rep (403) 220-3913 science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca, Student Ombuds Office: (403) 220-6420 ombuds@ucalgary.ca, <http://ucalgary.ca/provost/students/ombuds>
- g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend your cell phone should be turned off unless instructed otherwise. All communications with other individuals via laptop computers, cell phones or other devices connectable to the internet in not allowed during class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.
- h) **U.S.R.I.:** At the University of Calgary feedback provided by students through the Universal Student ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference – please participate in USRI surveys.

Department Approval _____ Date _____

Faculty Approval for
out of regular class-time activity: _____
Date: _____

Faculty Approval for
Alternate final examination arrangements: _____
Date: _____

A signed copy of this document is on file in the Computer Science Main Office

CPSC 319 Percentage to Letter Grade Conversion Table

A+	95-100
A	90-95
A-	85-90
B+	80-85
B	75-80
B-	70-75
C+	65-70
C	60-65
C-	55-60
D+	50-55
D	45-50
F	0-45

CPSC 319 Syllabus

Tentative Topics Covered:

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Introduction
Definitions
Classification of Data Structures
Operations on Data Structures

Analysis of Algorithms
Introduction
Complexity
Asymptotic Complexity
Upper and Lower Bounds
Big-O Notation
Classes of Algorithms
 Ω and Θ Notations
Best, Worst, and Average-Case Complexities
Examples

Searching and Sorting
Terminology
Sequential Search
Binary Search
Interpolation Search
Sorting Terminology
Analyzing Sorts
Bubble Sort
Selection Sort
Insertion Sort
Ideal Performance of Sorts
Merge Sort
Quick Sort

Arrays and Linked Lists
Lists
Arrays
Linked Lists
Doubly Linked Lists
Circular Lists
Sparse Tables
Stacks and Queues
Stacks
Queues
Priority Queues

Trees
Introduction
Binary Trees
Binary Search Trees

AVL Trees
The Need for Balanced Trees
Balance of a Node
AVL Trees
Node Structure
Insertion into an AVL Tree

Graphs
Classification
Definitions
Operations on Graphs
Graph Representation
Graph Traversals
Dijkstra's Algorithm
Minimum Spanning Trees
Topological Order

Hash Tables
Introduction
Hash Functions
Collision Resolution
Measuring Hashing Performance

Heaps and Heapsort
Heaps
Heapsort

Learning Outcomes:

By the end of the course, students will:

1. By the end of this course, students should be able to do complexity analysis of algorithms written in a programming language.
2. By the end of this course, students should be able to write a program that implements several different sorting algorithms, and create a report that compares their relative performance.
3. By the end of this course, students should be able to create a program that implements a linked list data structure using well-structured object-oriented techniques in the Java programming language.
4. By the end of this course, students should be able to implement stack and queue data structures in the Java programming language.
5. By the end of this course, students should be able to implement a binary search tree data structure in the Java programming language.
6. By the end of this course, students should be able to implement a balanced tree data structure (such as an AVL tree) in the Java programming language.
7. By the end of this course, students should be able to write a program in the Java language that implements a graph data structure with various kinds of graph traversals.
8. By the end of this course, students should be able to implement a hash table with collision resolution in the Java programming language.

Allowable Sources:

List any texts, websites, etc that are allowable for use in the course

Cited Sources:

What and how should sources be cited.

Examples: Code, design/ideas, etc.

Level of Collaboration between Students:

Will students be collaborating on course components, yes or no? To what extent? Can be different for different course components.

How will collaboration with others be cited?

Disclosure Policy

If you discuss the assignments with others, make sure to cite these discussions.