



Approved by Chair:

Dec 15, 2021

Signature

COURSE SECTION INFORMATION

Data Structures and Algorithms

Teacher's Name Andrew Rudder

Course Code: COMP 2080

Email Andrew/Rudder@georgebrown.ca

Course Section

Phone

Academic Year 2021-2022

Office

Term Winter 2022

Out of Class Assistance

All academic inquiries will be replied to within three business days.

LIST OF TEXTBOOKS AND OTHER TEACHING AIDS:

Required:

1. Object-Oriented Data Structures Using Java, 4th edition
Author: Nell Dale, PhD; Daniel T. Joyce; Chip Weems
Publisher: Jones & Bartlett Learning; **4th Edition** (Sept. 12, 2016)
Language: English ISBN-10: 1284089096 ISBN-13: 978-1284089097

Recommended Resources:

Course Delivery Mode

- **Lectures:** All sessions except mid-term and final exams will be online.
- **Labs:** All sessions will be in-person, and students must attend all the classes on campus.

Any variation to the above note will be posted on the blackboard in advance.

Detailed Evaluation System

Assessment Tool:	Description:	Outcomes assessed:	EES	Date / Week:	% of Final Grade:
2 Quizzes	Quizzes done in the Lecture. Students have to be present to take the quiz.	1, 2, 3, 4, 5	4, 5, 6	TBA	10

Lab Test 1	Hands-on test conducted in the lab where students have to demonstrate their skills.	1, 2, 3,5	1, 2, 4	Week 4	10
Assignment 1	Take home assignment.	1, 2, 3, 5	4, 5, 6	Week 6	10
Mid Term Exam	Test that evaluates concepts learned in the class and lab.	1, 2, 3, 5	1, 2, 4	Week 7	20
Lab Test 2	Hands-on test conducted in the lab where students have to demonstrate their skills.	1,2,3,5	4, 6, 7	Week 11	10
Assignment 2	Take home team assignment.	1, 2, 3, 4, 5	4,5,6,9,10	Week 13	15
Final Exam	Test that evaluates concepts learned in the class and lab.	1, 2, 3, 4, 5	2,4,5	Week 15	25
				TOTAL:	100%

Learning Schedule / Topical Outline (subject to change with notification)

TOPICAL OUTLINE:

Week	Topic / Task	Outcome(s)	Content / Activities	Resources
1	1,14,15	1,4,5	<ul style="list-style-type: none"> - Intro to Data Structures - Relevance to Software Engineering (Object Orientation, Class Organization) - Comparing Algorithms - Array based Algorithms - Searching Algorithms (Linear Search and Binary Search) - Simple Sorts (Selection Sort) 	Chapter 1,11
2	2	1, 2, 3, 4	<ul style="list-style-type: none"> - Simple Sorts (Insertion and Bubble Sort) - Recursive Definitions, Algorithms and programs - Recursive Array Processing - Memoization - Recursive examples 	Chapter 3,11
3	14	1, 2,3,4	<ul style="list-style-type: none"> - Recursive Sorting Applications - $O(N \log_2 N)$ Sorts (MergeSort and QuickSort) - Big-O Notation 	Chapter 1,3
4	4	1, 2, 3, 5	<ul style="list-style-type: none"> - Linked Lists - Arrays Versus Linked Lists - Operations on Linked Lists (Add First, Add Last, Search, Traversal) Lab Test #1 (week 4)	Chapter 2
5	3,4,5	1, 3, 5	<ul style="list-style-type: none"> - Operations on Linked Lists (Insert In order, Delete) - Doubly Linked Lists - Abstract Data types - Stacks and Queues (Definitions and operations) 	Chapter 2,4

			<ul style="list-style-type: none"> - Array-Based Implementations - Link-Based Implementations 	
6	6-9	1, 3	<ul style="list-style-type: none"> - List ADT and interface - Array and Link Based implementations - Collection ADT and Interface - Array and Link Based implementations - Java Collections Framework - Bag ADT and Set ADT Assignment #1 Due	Chapter 5,6
7			Mid-Term Exam	
8	INTERSESSION WEEK			
9	11	1, 3, 5	<ul style="list-style-type: none"> - Hashing - Hash Function design - Load Factor, Choice of Array size - Collision handling strategies (Linear, Quadratic, Double Hashing and separate chaining) 	Chapter 8
10	10	1, 3, 5	<ul style="list-style-type: none"> - Binary Search Tree ADT - Binary search tree Insertion - Tree Traversals (Pre, In, Post) - Binary Search Trees Performance 	Chapter 8
11	10,12	1, 2, 3, 5	<ul style="list-style-type: none"> - Binary Search Tree Operations (Delete, Level Order Traversal) - Balanced Binary Trees (AVL or R/B) - Min, Max Heaps - Heap Operations - Priority Queue ADT Lab Test #2 (week 11)	Chapter 8,9
12	13	1, 3, 5	<ul style="list-style-type: none"> - Graph (Definitions, Types) - Graph Representations (Adjacency Matrix, List Adjacency) - Basic Graph Traversals (Breadth First Search, Breadth First Search) - Graph Traversals 	Chapter 10
13	13	1, 3, 5	<ul style="list-style-type: none"> - Graph Algorithms - Shortest Path Algorithms (Dijkstra's Algorithm) - Topological sorting - Minimum Spanning Trees(Prims method) 	Chapter 10

			Assignment #2 due	
14	13	1, 2, 3	<ul style="list-style-type: none"> - Java Graph ADT - Graph Applications 	Chapter 10
15			Final Exam	
<p>Please note: this schedule may change as resources and circumstances require.</p> <p>For information on withdrawing from this course without academic penalty, please refer to the College Academic Calendar: http://www.georgebrown.ca/Admin/Registr/PSCal.aspx</p>				