CIS 22C.42Z: CRN: 13624, Summer 2024, Synchronous

CIS 22C.63Z: CRN: 13613, Summer 2024, Asynchronous

Data Abstraction and Structures
Credit-Degree Applicable
4.5 quarter units (3 semester units)
July 01, 2024 – August 09, 2024

Class Meets Online Synchronously, 3:00 – 3:50 pm, Mon, Wed,
and the lectures are also recorded.
Classes are recorded at 3:00 pm – 3:50 (PST) Mon, Wed.
Office Hours in Zoom: Mon, Wed, 2:00 pm – 3:00 pm (PST), online, one for each section.
Instructor: Hussein Al-Hussein, Ph.D. (MS, Ph.D. from Stanford University)
Email: alhussein@fhda.edu

Course Registration Number (CRN): 13624 Synchronous, 13613 Asynchronous

Section: 42Z synchronous, 63Z asynchronous
Units: 4.5 quarter units (3-semester units)

Welcome to your class zyBook
Textbook: CIS 22C: Data Structures in C++

zyBook ISBN: 979-8-203-37603-9

Instructions for students

Students will access zyBooks through links in Canvas

> 1. Click any zyBooks assignment link in your learning management system (Do not go to the zyBooks website and create a new account)
> 2. Subscribe

*A subscription is **$49.95**. Students may begin subscribing on Jun 18, 2024, and the cutoff to subscribe is Aug 10, 2024. Subscriptions will last until Aug 24, 2024.*

Description from Catalog:

Application of software engineering techniques to the design and development of large programs; data abstraction and structures and associated algorithms: stacks, queues, linked lists, trees, graphs, and hash tables; internal and external sorting; use of recursion; team project.

Student Learning Outcome Statements (SLO):

- Read, analyze, and explain advanced data structures programs.
- Design solutions for advanced problems using appropriate design methodology incorporating advanced data structures programming constructs.
- Create and analyze the efficiency of advanced-level data structures algorithms, code, document, debug, and test advanced data structures programs using multiple source and header files.

Advisory preparation:

- CIS 22B or CIS 35A.
- Advisory: Mathematics 212 or equivalent.

Work Required: 15 hours per week

Grading:

- ZyBooks & Labs: 40%
- Midterm: 30%
- Final: 30%

Grade average required:

- A+: 98-100·
- A: 92-97
- A-: 90-91
- B+: 88-89
- B: 82-87
- B-: 80-81
- C+: 78-79
- C: 70-77
- D+: 68-69
- D: 62-67
- D-: 60-61
- F: 59 and less

Student Resources:

The college has gathered all Canvas Resources for Students into a library; here is the link:

https://deanza.instructure.com/courses/3382

Expanded Description: Content and Form the zyBooks

ZyBook Sections

Table of contents (ZyBooks Sections)

4.11 Linked lists: Recursion
4.12 Array-based lists
4.13 LAB: Sorted number list implementation with linked lists

Ch 05. Stacks and Queues
5.1 Stack abstract data type (ADT)
5.2 Stacks using linked lists
5.3 Array-based stacks
5.4 Queue abstract data type (ADT)
5.5 Queues using linked lists
5.6 Array-based queues
5.7 Deque abstract data type (ADT)
5.8 C++ stack class
5.9 C++ queue class
5.9 LAB: Grocery list editor with undo stack

Ch 06. Hash Tables
6.1 Map ADT
6.2 Hash tables
6.3 Chaining
6.4 Linear probing
6.6 Double hashing
6.7 Hash table resizing
6.7 Common hash functions
6.8 Common hash functions
6.9 Direct hashing
6.11 C++ unordered_map class
6.12 LAB: Course gradebook with unordered_map

Ch 07. Trees
7.3 Binary search trees
7.4 BST: Search algorithm
7.5 BST: Insertion
7.6 BST: Remove
7.7 BST: Traversal
7.8 BST: Height and insertion order
7.9 BST: Recursion
7.10 BST: Parent node pointers
7.11 Set abstract data type (ADT)
7.12 Implementing a set ADT with a BST
7.13 C++ unordered_set class
7.15 LAB: BST validity checker

Ch 08. Balanced Trees

8.1 AVL: A balanced tree
8.2 AVL rotations
8.3 AVL insertions
8.4 AVL removals
8.9 LAB: AVL tree Nth largest operation
8.10 LAB: AVL tree Nth largest operation

Ch 10. Graphs

10.1 Graphs: Introduction
10.3 Graph representations: Adjacency lists
10.4 Graph representations: Adjacency matrices
10.5 Directed graphs
10.6 Weighted graphs
10.7 Vertex, Edge, and Graph classes
10.8 Graphs: Breadth-first search
10.9 Graphs: Depth-first search
10.10 Algorithm: Dijkstra's shortest path
10.11 Algorithm: Bellman-Ford's shortest path
10.13 Minimum spanning tree
10.14 All pairs shortest path
10.15 LAB: Graph representations

Ch 11. Algorithms

11.1 Huffman compression
11.4 Greedy algorithm
11.5 Dynamic programming
11.6 Lab: Longest common subsequence

Assignments

A. Reading: Required reading from the online interactive text
B. Doing the homework zyBooks assignments online.

Compilers & IDE:

- **Windows & Mac:**

Visual Studio 2022: Community (Free):

https://visualstudio.microsoft.com/downloads

VSCode (Windows and Linux and Mac) (Free):

https://code.visualstudio.com/download

- **Mac:** Xcode, Neovim
- **Online Compiler:**

https://www.onlinegdb.com/online_c++_compiler (recommended, free)

https://www.tutorialspoint.com/compile_cpp_online.php

https://www.programiz.com/cpp-programming/online-compiler/

Useful Tutorials:

https://www.geeksforgeeks.org/cpp-tutorial

https://www.geeksforgeeks.org/cpp-tutorial/

https://www.tutorialspoint.com/cplusplus/index.htm

https://thispointer.com/c11-tutorial

Useful Interview Problems:

https://interview.leetcode.com/interview/login/

https://www.hackerrank.com/domains/cpp

C++ Uses:

https://www.simplilearn.com/tutorials/cpp-tutorial/top-uses-of-c-plus-plus-programming

https://www.codingninjas.com/blog/2021/07/29/c-vs-java-vs-python-which-one-to-choose/