CIS 22C.88Z: CRN: 47512, Spring 2025, Asynchronous
Data Abstraction and Structures
Credit Degree Applicable
4.5 quarter units (3 semester units)
Start Date: 04/07/2025.
End Date: 06/27/2025.

Class Meets Online (Attendance Optional), 3:30 – 5:20 pm, Wed,
and the lectures are also recorded.
Classes are recorded at 3:30 pm – 5:20 (PST) Wed.
Office Hours in Zoom: Wed, 2:30 pm – 3:30 pm (PST), online.
Instructor: Hussein Al-Hussein, Ph.D. (MS, Ph.D. from Stanford University)
Email: alhussein@fhda.edu

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 **$xx.xx**. Students may begin subscribing on xxx, and the cutoff to subscribe is xxx. Subscriptions will last until xxx.*

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)

Ch 01. Introduction to Data Structures and Algorithms
1.1 Data structures
1.2 Introduction to algorithms
1.4 Abstract data types
1.6 Algorithm efficiency
1.7 LAB: Introduction to data structures labs

Ch 02. Searching and Algorithm Analysis

2.1 Searching and algorithms
2.2 Binary search
2.3 Constant time operations
2.4 Growth of functions and complexity
2.5 O notation
2.6 Algorithm analysis
2.7 Recursive definitions
2.8 Recursive algorithms
2.9 Analyzing the time complexity of recursive algorithms
2.10 LAB: Binary search template function

Ch 03. Sorting Algorithms

3.1 Sorting: Introduction
3.2 Selection sort
3.3 Insertion sort
3.4 Shell sort
3.5 Quicksort
3.6 Merge sort
3.8 Overview of fast sorting algorithms
3.9 C++: Sorting with different operators
3.10 LAB: Natural merge sort

Ch 04. Lists

4.1 List abstract data type (ADT)
4.2 Singly-linked lists
4.3 Singly-linked lists: Search and insert
4.4 Singly-linked lists: Remove
4.5 Doubly-linked lists
4.6 Doubly-linked lists: Search and inserts
4.7 Doubly linked lists: Remove
4.8 Linked-list traversal
4.9 Sorting linked lists
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

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/