CS 692 Comprehensive Exam – Fall 2022
Advanced Algorithms (second exam)

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Virtual Office Hours: MW: 10:00 - 11:00 am (by appointment)

Exam Date: Friday, 10/28/2022, 3:00 -4:30 pm, Meiklejohn Hall, Rm. 2032

Catalog Description: A synthesis of important areas of Computer Science, culminating in comprehensive examinations covering three required courses in the Master's degree: Advanced Algorithms, Theory of Computation, and Operating System Design.

Prerequisites: Department consent, minimum 3.0 GPA and advancement to candidacy.
Credit Restrictions: Computer Science M.S. students only.

Credit Equivalency: CS 6901

Grading: CR/NC grading only.

Make sure to study this page for most updated information
(https://www.csueastbay.edu/cs/graduate-capstone/index.html**).**

Link to FAQ. Please read before asking the same questions:
https://www.csueastbay.edu/cs/graduate-capstone/cs-6901-cap-exp/faq.html

Previous year Exams: https://www.csueastbay.edu/cs/graduate-capstone/cs-6901-cap-exp/past-exams/examples.html

Prerequisites: To enroll in the course you must (i) have completed ALL admissions prerequisites, including the WST, (ii) have taken all five required courses CS 601, CS 611, CS 621, CS 651, and CS 671 (unless your entered under the quarter system), and (iii) have a GPA of 3.0 or better.

Online Office Location: Virtual

Office Hours
Each week, I will be available for live chat (through email or by zoom if email message passing is not enough or video chat is more desired) based on scheduled appointment basis. We will use zoom meetings (web conferencing tool) for live video chats once needed. The link to the meeting will be provided to you and you can use it to connect to the meeting room. If you have questions of a personal nature, like grades or challenges, please email me directly using your CSUEB email account.

Exam Instructions:

- Use the facilities prior to the test, you must stay in the room for the duration of the test

- **Have a PHOTO ID once you take the exam.** Keep that available and show it when you turn in your papers.

- Please be available 15 minutes in the exam's room before the exam starting time above.

- You can turn-in answers to **ONLY** TWO out of THREE questions.

- Please be concise.

- Deactivate all cellular phones during the exam.

- Turn off all mobile devices, phones, etc.

- Please write dark and readable.

- Answer paper will be provided.

- Our number one priority is the health and safety of our guests and associates. As per our campus protocols, please **mask up** during the exam.

All programming answers for the Data Structure and Algorithms exam must be given in the C or C++ languages. Solutions in Java or other languages will not be accepted.

Note: For your code that manipulates fundamental data structures you can't call routines that perform the work we are asking you to do. That is, you cannot use built-in libraries to manipulate arrays, linked lists, etc. If working with linked lists, for example, you should work with the pointers and manipulate them, so on.

Grading: The course grade is based solely on the exam scores and results in CREDIT or NO CREDIT for the course. The student will complete 2 questions on each test, where each question is worth 20 points. The student must pass each test individually, with a score of 24/40 (60%) or better.

If the student passes all 3 tests, they will receive a CREDIT (PASS) grade. If the student does not pass all 3 tests, a NO CREDIT grade will be issued. In this case, the student should contact the graduate coordinator about re-taking the exam. The following is the standardized Student Learning Outcome (SLO) for each exam:

Grading

Result	Grade	Student Learning Outcome
Excellent	35-40 pts	: Understands essentially correct solution
Good	29-34 pts	: Understands correct solution, but some errors in execution
Passing	24-28 pts	: Some understanding of solution, but has errors
Poor	13-24 pts	: No understanding of solution, but has some knowledge of topic area

Grading

Result	Grade	Student Learning Outcome
No Effort	0-12 pts	: No understanding of the solution, or the topic area

The above descriptions are on a per answer basis, and do not account for the variety between the two selected problems in the section. For example, scores of 17 and 17 are both essentially correct and yield an overall Excellent (34) result. Another example is an Adequate (22) result derived from an Excellent (17) understanding of one problem but No Effort (5) on the other problem.

Syllabus – Data Structures and Algorithms

1. Analysis Framework

    a. Asymptotic notations: big-oh, little-oh, big theta, big omega, little omega

    b. Algorithms' run-time analysis and basic operations

    c. Worst-case, best-case, average-case analysis of algorithms

    d. Counting operations

2. Basic data structures, including specification, use, and storage analysis

    a. Stacks

    b. Queues

    c. Hashing

    d. Trees

    e. Heaps and priority queues

    f. Linked Lists

3. Search, sequential, binary search, exhaustive and analysis

4. Recursive functions and recurrence relations and their analysis

5. Sorts and their analysis

    a. Elementary sorts (Insertion, Selection, Bubble)

    b. Heapsort

c. Quicksort

d. MergeSort

e. Radix Sort

6. Tree types and analysis

a. General trees, Binary trees, Tree traversals (preorder, inorder, postorder and level-order), Binary Search Trees, Heaps and Priority Queues

7. Graph Algorithms and analysis

a. Graph representations, adjacency matrix, adjacency list

b. fundamental algorithms such as Dijkstra's algorithm (shortest path), DFS, BFS, MST via Kruskal's or Prim's.

8. Analysis of fundamental algorithms such as searching and sorting

9. String-matching methods

10. Lists, Arrays, Linked Lists, Stacks, Queues, Sorted and Unsorted Lists

References: (Textbooks)

J. Kleinberg, E. Tardos, Algorithm Design

Corman, Leiserson, Rivest, Stein: Introduction to Algorithms

Aho, Hopcroft, Ullman: The Design and Analysis of Computer Algorithms

Baase and Van Gelder: Computer Algorithms

Levitin: The Design and Analysis of Algorithms

Weiss: Data Structures and Algorithm Analysis

Policies & Notes

Academic Standards:

By enrolling in this course, the student agrees to uphold the standards of academic integrity described in the catalog at http://www20.csueastbay.edu/academic/academicpolicies/academic-dishonesty.html."

- Exams are to be individual, not team efforts. This means that there should be no sharing of code or answers. Sharing code or answers will be considered plagiarism. Plagiarism is the act of using someone else's words or programming code and claiming them as your own. (Please see refer to the CSUEB catalog for a complete description).
- Any student who is found to have plagiarized will receive a 0 on the corresponding assignment/exam and an academic dishonesty report will be filed. This will occur on the first infraction and will become part of the student's permanent academic record.
- Finding a solution to a question online is also not allowed. Such sharing constitutes academic dishonesty, as described in the CSUEB catalog. Any student who is found academically dishonest will receive a 0 on the program, lab, assignment, or exam and an academic dishonesty report will be filed. This will occur on the first infraction and will become part of the student's permanent academic record.

Disability Accommodations

If you need accommodation, please talk to Accessibility Services. Please contact me if my assistance is required.

Emergency Information

California State University, East Bay is committed to being a safe and caring community. Your appropriate response in the event of an emergency can help save lives. Information on what to do in an emergency situation (earthquake, electrical outage, fire, extreme heat, severe storm, hazardous materials, and terrorist attack) may be found here.

Discrimination, Harassment, and Retaliation (DHR)

California State University East Bay is committed to a community free from sexual assault and violence. Title IX and CSU policy prohibit discrimination, harassment and retaliation, including Sex Discrimination, Sexual Harassment or Sexual Violence. CSUEB encourages anyone experiencing such behavior to report their concerns immediately. CSUEB has both *confidential* and *non-confidential* resources and reporting options available to you. **As a faculty member, I am required to report all incidents and thus cannot promise confidentiality.** I must provide our Title IX coordinator and or the DHR Administrator with relevant details such as the names of those involved in an incident. For confidential services, contact the **Confidential Advocate** at **510-885-3700** or go to the Student Health and Counseling Center. For 24-hour crisis services call the Bay Area Women Against Rape (BAWAR) hotline at 510-845-7273. For more information about policies and resources or reporting options, please visit the following websites: https://www.csueastbay.edu/diversity/title-ix/

Muwekma Ohlone Tribal Land Acknowledgment For Cal State University East Bay located in Hayward, CA

 Please also read the Land Acknowledgment file honoring the Muwekma Ohlone Tribe posted under on the course page.