**CS 692 Comprehensive Exams – Fall 2022**

**Instructor:** Dr. Leann Christianson   
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**Office Hours:**

**Tuesday Zoom 1:15-2:15pm**. The Zoom id is 968 392 9212. A waiting room will be in place

**Thursday 2:45pm - 3:45 in my office in SF #567** – you can also use Zoom id is 968 392 9212

**Feel free to email –** Leann.Christianson@csueastbay.edu

**Class Schedule:**

There are no regular meetings of this class. You are encouraged to study for the Exam and to see the instructor during office hours for help with problem solving.

Students are encouraged to go through the old comprehensive exams which are posted here: https://www.csueastbay.edu/cs/graduate-capstone/cs-6901-cap-exp/past-exams/examples.html

A dedicated review session will be held Zoom Tuesday 9/20 from 2:15-3:15pm. This meeting is optional – here is the link  
<https://csueb.zoom.us/j/86287515741>

**Exam Date:**

**9/23, Friday 3-4:30pm in MI 2032**

**Prerequisites:**

To enroll in the course you must have completed ALL admissions prerequisites, have taken all three of the five required courses CS 601, CS 611, CS 621 **BEFORE** registering.

NOTE: All students taking CS 692 must be registered for the course.  If you need to take CS 692 more than once, you will need to pay for the units each time. However, you will only need to take the exam(s) that you did not pass.

**Catalog Description:**

A synthesis of important areas of Computer Science, culminating in comprehensive examinations covering the central areas of Operating Systems, Algorithms, and Theory of Computation.  Review of literature.  “Advanced to Candidacy” graduate status, GPA greater than or equal to 3.0.  
  
Grading:

CR/NC – A credit is given if the student passes all 3 of the Exams

**Extended Description:**

CS 692 is a 3-unit course, to be taken CR/NC. The course counts towards your 30 units for the Master's degree and fulfills the capstone requirement. This course consists of 3 exams, Systems, Advanced Algorithms, and Theory of Computation, mapping to three of the five required courses for the Master's degree. During the semester you will prepare for the exams. "Attendance/Participation" is not mandatory except for the exams.

**CS 692 can be taken a maximum of three times**. If a student is unable to pass all three exams after three attempts, they will, unfortunately, be removed from the program. Please note that students who attempt the exam once cannot change to capstone thesis or project options

**Exam Instructions:**

* An exam sheet with 3 questions and paper will be provided.
* Students must answer only two out of the three questions. Please note that an individual question may have multiple subparts.
* **All programming questions and answers should be written in the C or C++ languages.**
* **Students should write on one side of their answer paper only. Do not write on the exam question sheet itself.**
* **Name and which questions were chosen to complete should be marked on the cover sheet of the exam.**
* **At the end of the exam, students will tear off the cover sheet and staple it to their answer sheets.**

**Grading** **of Exam**

The course grade is based solely on the 3 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.

Students have the right to see the grading of their exams. If they feel they have been graded unfairly, they should first discuss this with the instructor in charge of the exam. If consensus is not achieved, the exam may be reviewed by the Department Graduate committee.

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 |
| 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.

**Class Policies** **& Notes**

* **Academic Standards:** By enrolling in this class 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 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 the program or assignment 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.*
  + “High level'' discussion of algorithms is acceptable, but detailed discussion is not. Any essential code included from sample programs must be properly acknowledged in comments. Any work not your own, e.g., results obtained from reference sources or from other individuals, should receive appropriate bibliographic citations.
* **Disabilities**: If you have a documented disability and wish to discuss academic accommodations, or if you would need assistance in the event of an emergency evacuation, please contact me as soon as possible. Students with disabilities needing accommodation should speak with the Accessibility Services.
* **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 at:

http://www20.csueastbay.edu/af/departments/risk-management/ehs/emergencymanagement/index.html

Please be familiar with these procedures. Information on this page is updated as required. Please review the information on a regular basis.

* **Discrimination, Harassment, and Retaliation (DHR)** 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. Non-confidential resources include faculty and staff, who are required to report all incidents and thus cannot promise confidentiality. Faculty and staff must provide the campus 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 BAWAR hotline at 510-845-7273. For more information about policies and resources or reporting options, please visit the following websites:

http://www.csueastbay.edu/af/departments/riskmanagement/investigations/register-complaints.html <http://www.csueastbay.edu/titleix>

* The University is committed to maintaining a safe and healthy living and learning environment for students, faculty, and staff. Each member of the campus community should choose behaviors that contribute toward this end <http://www.csueastbay.edu/studentconduct/student-conduct.html>

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

Jalquin/Yrgin Ancestral Muwekma Ohlone Territory

We would like to recognize that while we gather at Cal State University East Bay located in Hayward, CA, we are gathered on the ethno-historic tribal territory of the intermarried Jalquin (hal-keen) / Yrgin (eer-gen) Chochenyo-Ohlone-speaking tribal group, who were the direct ancestors of some of the lineages enrolled in the Muwekma Ohlone Tribe of the San Francisco Bay Area, and who were missionized into Missions San Francisco, Santa Clara and San Jose.

The present-day Muwekma Ohlone Tribe, with an enrolled Bureau of Indian Affairs documented membership of over 600 members, is comprised of all of the known surviving Indian lineages aboriginal to the San Francisco Bay region who trace their ancestry through the Missions San Jose, Santa Clara, and San Francisco, during the advent of the Hispano-European empire into Alta California beginning in AD 1769. They are the successors and living members of the sovereign, historic, previously Federally Recognized Verona Band of Alameda County now formally known as the Muwekma Ohlone Tribe of San Francisco Bay Area. Muwekma means La Gente – The People in their traditional Chochenyo-Ohlone language.

The land on which CSUEB in Hayward has been established, was and continues to be of great importance and significance for the Muwekma Ohlone Tribal people. This region extends to surrounding areas that held several Túupentaks (too-pen-tahks) (aka Temescals), traditional semi-subterranean spiritual roundhouses. Túupentaks were places of celebrations, healing, rituals, dances, intertribal feasts, and religious ceremonies. Nearby ancestral heritage “shellmound sites,” such as those located at Máyyan Šáatošikma ~ Coyote Hills, Berkeley, and Emeryville, served as the Muwekma Ohlone Tribe’s territorial monuments and traditional cemetery sites for high lineage families, craft specialists, and fallen warriors.

The region surrounding the City of Hayward, and Cal State University East Bay, is where many of their ancestral heritage cemetery and village sites are located. These localities are viewed as special and sacred places, and we respectfully acknowledge that they had been previously settled and owned by the ancestral Muwekma Tribal groups for many thousands of years. The location of the nearby Fairmont County Hospital was the place of one of the Tribe’s major rancherias called “The Springs,” during the middle-late 1800s where their families planted various crops and raised cattle. Today, the Muwekma Ohlone work as stewards for many of their 10,000-year-old ancestral heritage village and cemetery sites.

As mentioned before, the City of Hayward is established within their ancestral Jalquin/Yrgin Ohlone Tribal ethnohistoric territory, which based upon the unratified federal treaties of 1851-1852, includes the unceded ancestral lands of the Muwekma Ohlone Tribe of the San Francisco Bay Area. Missions San Francisco and San Jose records document that many of the enrolled Muwekma lineages are directly descended from the Jalquin/Yrgin Chochenyo Ohlone-speaking tribal groups, as well as from neighboring Ohlone tribes.

It is important that we not only recognize the history of the land of the Jalquin/Yrgin on which we gather to learn and participate, but also recognize that the First People of this region – the Muwekma Ohlone People, are alive and thriving members of the Hayward and broader Bay Area communities today.

Even though their tribe was denied a land base when it was first federally recognized, it is because of the tenacity and strength of their ancestors and elders, that their People have been able to maintain their traditions, and keep their culture and language alive. Furthermore, the Muwekma Ohlone families have never left their indigenous ancestral lands. Today they repair the sustained damages of over 251 years of colonization. They are focused on keeping their traditional culture strong, while they work for a bright and favorable future for their children, as they follow in the footsteps of their ancestors.

We respectfully request, that the good citizens of the City of Hayward and surrounding Towns strive to be faithful stewards on behalf of the Muwekma Ohlone Tribe by maintaining the bay, freshwater ways, native plants, animal habitats, and the air we all breathe. Furthermore, we request that the City of Hayward and surrounding Towns honor the military service of the Muwekma men and women who have honorably served overseas during World War I, World War II, Korea, Vietnam, Desert Storm, Iraq and who are still serving in the United States Armed Forces today; and honor the tribal veterans and service members from California, North and South America.

In closing, it is of great importance to acknowledge the significance of this Holše Warep (hol-sheh wah-rehp) ~ Beautiful Land to the indigenous Muwekma Ohlone People of this region. We ask everyone who attends or visits Cal State University East Bay in Hayward, to be respectful of the aboriginal lands of the Muwekma Ohlone People, and consistent with their principles of community and diversity strive to be good stewards on behalf of the Muwekma Ohlone Tribe, on whose land you are their guests. Aho!

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

Jalquin/Yrgin Ancestral Muwekma Ohlone Territory

**Operating Systems Topics**

**Topics – Operating Systems**

1. Processor management

a. Process control blocks

b. Long and short-term schedulers

c. Scheduling algorithms

d. Context switching

e. System calls and interrupts

f. Inter-process communication.

g. Definition of critical sections, requirements for solution to critical section problem.

h. Concurrency solutions, including hardware solutions (disabling interrupts, atomic ops), and software solutions (semaphores, monitors)

i. Standard synchronization problems, including producer/consumer, dining philosophers, readers/writers

j. Concurrency and parallel processing.

2. Memory management

a. Logical/physical addresses

c. Paging

d. Page table implementation, including multi-level paging, hashed, inverted page tables

e. Segmentation

f. Page replacement algorithms

g. Frame allocation algorithms, working sets, reactive scheme using page fault rate

3. Device management

a. Interrupt servicing

b. Disk scheduling

4. Deadlock

a. Characterization including necessary conditions

b. Detection (Safe State), Prevention

c. Avoidance, including Banker’s algorithm

d. Recovery

5. Virtualization and Virtual Machines.

a. Virtual Machine Memory Management.

6. OS architectures - Monolith, Module, or layered– benefits and disadvantages

**References:  (Textbooks)**

Silberschatz et al: Operating Systems Concepts

Stallings: Operating Systems

Tannenbaum: Modern Operating Systems