CS 692-01 (2139) Capstone Examinations
Theory Exam Syllabus
Fall 2022

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Virtual Office Hours: Tu 10AM - 12PM or by appointment
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Exam Date: **Theory Exam**
Friday, 12/2/2022, 3PM - 4:30PM
MI-2032

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.

Prerequisites: To enroll in the course you must (i) have completed ALL admissions prerequisites, including the WST, (ii) 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. Prerequisites: Department Consent.
Credit Restrictions: Computer Science M.S. students only.
Grading: CR/NC grading only.

Extended Description:
CS 692 is a 3-unit hybrid course, to be taken CR/NC. The course counts towards your 30 units for the Master's degree and fulfills your capstone requirement. This course consists of 3 exams, Operating Systems, Advanced Algorithms, and Theory of Computation, mapping to three of the five required courses for the Master's degree. The semester will be spent helping you 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 parts of the comprehensive exam after three attempts, they will, unfortunately, be removed from the program.

Exam Instructions:

- Students must answer only two out of the three questions. Please note that an individual question may have multiple subparts. Please be concise.
- All programming answers for the Data Structures exam must be given in the C or C++ languages. Solutions in Java or other languages will not be accepted

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	34-40 pts	Understands essentially correct solution
Good	27-33 pts	Understands correct solution, but errors in execution
Adequate	22-26 pts	Some understanding of solution, but has serious errors
Poor	13-21 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.

Theory of Computation Syllabus

Topics

Automata:

1. Alphabets, Strings, and Languages
2. Regular Languages
    a. Deterministic Finite Automata
    b. Nondeterministic Finite Automata
    c. Regular expressions and operators
    d. Pumping Lemma for Regular Languages
3. Context-Free Languages
    a. Grammars and Ambiguity

b. Context-Free Grammars and Chomsky Normal Form

c. Pushdown Automata

d. Pumping Lemma for Context-Free Languages

Complexity:

1. Turing Machines and Decidability

a. Decidable, Acceptable and Co-Acceptable Languages

b. Turing-Completeness

c. Reducibility

d. The Halting Problem and Undecidable Problems

2. Complexity Classes

a. Polynomial Reducibility

b. Time Complexity: P, NP, coNP and EXPTIME

c. Space Complexity: PSPACE, NPSPACE, EXPSPACE

d. NP-Completeness and NP-Complete Problems

References (Textbooks)

Automata:

Garey and Johnson: Computers and Intractability

Hopcroft, Motwani, Ullman: Introduction to Automata Theory, Languages, and Computation

Johnson and Reiter: The Limits of Computation

Kozen: Automata and Computability

Sipser: Theory of Computation

Complexity:

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Advice:

The best way to study for these exams is to write out complete solutions to past problems. See the instructor for each topic if you need help or want your solutions evaluated.

Virtual Office Hours:

Each week, I will be available for live chat (through email or by zoom if email message 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 is 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.

Class Policies & Notes

- **Academic Standards:** By enrolling in this class the student agrees to uphold the standards of academic integrity described in the catalog and on the Academic Policies web page: https://www.csueastbay.edu/aps/academic-policies/index.html

  - Finding a solution online is also not allowed. Plagiarism is the act of using someone else's words or programming code and claiming them as your own. This means that there should be no sharing of answers. Such sharing constitutes *academic dishonesty*, as described in the CSUEB catalog. *Any student who is found academically dishonest 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.*

- **Incompletes** will be granted to those with extreme emergencies who have finished half of the coursework and have completed the first midterm with a passing grade. A documented reason as to why you cannot finish the course is necessary. Examples include hospitalization and death in the family. Travel or unsatisfactory performance in the course is not a justifiable reason.

- **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: https://www.csueastbay.edu/accessibility/

- **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 Risk Management web pages: https://www.csueastbay.edu/riskmanagement/

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

- **A Note on 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/

- 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. View the Standards for Student Conduct:
  https://www.csueastbay.edu/studentconduct/student-conduct.html

Muwekma Ohlone Tribal Land Acknowledgment

Cal State University East Bay recognizes that it is located on the ethnohistoric territory of the Jalquin (hal-keen) / Yrgin (eer-gen), the ancestral and unceded land of the Chochenyo Ohlone-speaking People, the successors of the sovereign Verona Band of Alameda County. This land was and continues to be of great importance to the Muwekma Ohlone Tribe and other familial descendants of the Verona Band.

We recognize that every member of the Hayward community has, and continues to benefit from, the use and occupation of this land, since the institution's founding in 1957. Consistent with our values of community, inclusion, and diversity, we have a responsibility to acknowledge and make visible the university's relationship to Native peoples. As members of the Hayward community, it is vitally important that we not only recognize the history of the land on which we stand, but also, we recognize that the Muwekma Ohlone people are alive and flourishing members of the Hayward and broader Bay Area communities today.