Syllabus for CSE100: Algorithm Design and Analysis

Fall 2021
Instructor: Sungjin Im

Designation:	CSE 100 Algorithm Design and Analysis
Catalog Description:	Introduction to the design and analysis of computer algorithms. Topics include analysis and implementation of algorithms, concepts of algorithm complexity, and various algorithmic design patterns. Course will also cover major algorithms and data structures for searching and sorting, graphs, and some optimization techniques.
Text Books and Other Required Materials:	T.H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein. Introduction to Algorithms, MIT Press, 3rd edition, 2009. ISBN 0-262-03384-4
Course Objectives/ Student Learning Outcomes:	The course introduces the basics of computational complexity analysis and various algorithm design paradigms. The goal is to provide students with solid foundations to deal with a wide variety of computational problems, and to provide a thorough knowledge of the most common algorithms and data structures. Topics include analysis and implementation of algorithms, concepts of algorithm complexity, and various algorithmic design patterns. The course will also cover major algorithms and data structures for searching and sorting, graphs, and some optimization techniques. In addition to learning about all these different topics, by the end of the class, you should be able to model a computational problem, understand the trade-offs in the design of a solution, and be able to implement a software solution to the problem. In the overall picture of the CSE program, this is one of the few classes that will teach you foundational skills to develop solutions for computation problems and the skills to implement the solutions in software.
	By the end of the course, students will be able to:
	(1) apply knowledge of computing and mathematics to algorithm design;
	(2) analyze a problem and identify the algorithm appropriate for its solution;
	(3) to design, implement, and evaluate an algorithm to meet desired needs
	(4) ability to compare and analyze different algorithms and their usage
Program Learning Outcomes:	
Prerequisites by Topic:	Class Prerequisite: CSE 030, CSE 031, MATH 024, MATH 032, where CSE 031 and MATH 024 can be taken concurrently with CSE 100.
	Proficient level of programming skills in C/C++/Java and elementary data structures. Basic math and probability knowledge required.
Course Policies:	
Academic Dishonesty Statement:	a. Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy. Any work submitted by a student in this course for academic credit will be the student's own work.
	b. You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting"

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	help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e mail, an e mail attachment file, a diskette, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action. c. During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.
Disability Statement:	Accommodations for Students with Disabilities: The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations.
Topics:	Asymptotic notation. Divide-and-conquer. Recurrent equations and the master theorem. Space and time complexity. Loop invariants. Linear and binary search. Sorting algorithms: insertion sort, selection sort, mergesort, quicksort, heapsort. Sorting lower bounds. Heaps. Binary search trees. Hash tables with chaining and open addressing. Dynamic programming and greedy algorithms. Graphs: definition and relevant problems (path search, flow, minimum spanning trees).
Class/laboratory Schedule:	see registrar website
Midterm/Final Exam Schedule:	Midterms 1, 2, 3 (see CatCourses) Final: see the registrar website
Course Calendar:	
Professional Component:	
Assessment/Grading Policy:	Lab assignments: 20% Midterms 1, 2, 3: 18% each Final: 26%
Coordinator:	Sungjin Im
Contact Information:	Email: sim3@ucmerced.edu Office: SE2-214
Office Hours:	See CatCourses