

## Syllabus for CSE100-01: Algorithm Design and Analysis

Fall 2015

Instructor: Sungjin Im

<b>Designation:</b>	CSE 100 Algorithm Design and Analysis
<b>Catalog Description:</b>	Introduction to the design and analysis of computer algorithms. Topics will include concepts of algorithm complexity, and various algorithmic design patterns like divide and conquer, dynamic programming and greedy algorithms. Course will also cover major algorithms and data structures for searching and sorting, graphs, and some optimization techniques.
<b>Text Books and Other Required Materials:</b>	T.H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein. Introduction to Algorithms, MIT Press, 3rd edition, 2009. ISBN 0-262-03384-4
<b>Course Objectives/ Student Learning Outcomes:</b>	<p>Course Goals:</p> <p>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.</p> <p>Learning Outcomes:</p> <p>By the end of course through lectures, readings, homeworks, lab assignments and exams, students will demonstrate:</p> <ul style="list-style-type: none"><li>- The abilities (1) to apply knowledge of computing and mathematics to algorithm design; (2) to analyze a problem and identify the computing requirements appropriate for its solution; (3) to design, implement, and evaluate an algorithm to meet desired needs; and (4) to apply mathematical foundations, algorithmic principles, and computer science theory to the modeling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices.</li><li>- An ability to apply design and development principles in the construction of software systems of varying complexity.</li><li>- An ability to function effectively as a member of a team in order to accomplish a common goal.</li><li>- Recognition of the need for and an ability to engage in continuing professional development.</li><li>- An ability to use current techniques, skills, and tools necessary for computing practice.</li></ul>
<b>Program Learning Outcomes:</b>	
<b>Prerequisites by Topic:</b>	Class Prerequisite: CSE 031: Introduction to Computer Science and Engineering II 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" 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**

see registrar website

**Schedule:**

**Midterm/Final Exam**

**Schedule:**

**Course Calendar:**

**Professional Component:**

**Assessment/Grading**

Homeworks: 20%

**Policy:**

Lab assignments: 20%

Midterm: 30%

Final: 30%

**Coordinator:**

Sungjin Im

**Contact Information:**

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**Office Hours:**

TBD