***Syllabus***

**CST 370 – Design and Analysis of Algorithms**

**California State University, Monterey Bay Spring 2020**

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# Course Information

Credits: 4.0

Prerequisites: CST 238 or Instructor's consent

**Section 1**: TR, 10:00A – 11:50A, BIT Building, Room 224

**Section 2**: TR, 2:00P – 3:50P, BIT Building, Room 110

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# Course Description

In this course, students will learn important data structures in computer science and acquire fundamental algorithm design techniques to get the efficient solutions to several computing problems from various disciplines. Topics include the analysis of algorithm efficiency, hash, heap, graph, tree, sorting and searching, brute force, divide-and- conquer, decrease-and-conquer, transform-and-conquer, dynamic programming, and greedy programming.

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# **Instructor**

Name: YoungJoon Byun, Ph.D.

Email: ybyun@csumb.edu

Phone: 831-582-3602

Zoom: <https://csumb.zoom.us/j/4457737239>

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# **Office Hours**

Tuesday 1:00P – 2:00P

Tuesday 4:30P – 5:30P

Thursday 1:00P – 2:00P

Or by appointment

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# **Course Web Site**

http://ilearn.csumb.edu/

Additional course information and announcements will be available on this site. It is the student's responsibility to check this site frequently.

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# Strongly Recommended Text

Author: Anany Levitin

Title: Introduction to the Design and Analysis of Algorithms, 3rd Edition

Publisher: Addison Wesley, 2011

ISBN-13: 978-0-13-300136-5 (This is **eTextBook**. But a paper book is also fine.)

# Recommended References

1. Author: Anany Levitin and Maria Levitin

Title: Algorithmic Puzzles

Publisher: Oxford University Press, 1st edition

ISBN: 978-0199740444

1. Author: Mark Allen Weiss

Title: Data Structures and Algorithm Analysis in C++

Publisher: Pearson

ISBN: 978-0132847377

1. Author: Steven Skiena

Title: The Algorithm Design Manual, 2nd Edition

Publisher: Springer, 2011

ISBN: 978-1848000698

1. Author: Cay Horstmann  
   Title: Big C++, 3rd Edition  
   Publisher: Wiley  
   ISBN: 978-1-119-40297-8

# Course Objectives

The main objectives of this course are to provide students with the knowledge of algorithms for fundamental problems in computer science and data structures to support the efficient implementation of these algorithms. It also teaches the methods of analyzing efficiency of algorithms. Data structures and algorithms are core components in computer science to build large and reliable software systems. To meet these objectives, students will learn several fundamental algorithm design techniques such as brute force, divide-and-conquer, decrease-and-conquer, transform-and-conquer, dynamic programming, and greedy programming. They will also acquire several important data structures such as hash, heap, tree and graph.

# **Course Outcomes**: Upon completion of this course, students should be able to

* Measure the efficiency of an algorithm and use asymptotic notations to represent the efficiency.
* Understand important algorithm design techniques such as brute-force, divide-and-conquer, decrease-and-conquer, transform-and-conquer, greedy method, and dynamic programming.
* Explain different sorting techniques such as heapsort, merge sort, and quick sort.
* Describe tree and graph-based algorithms such as depth-first search, breadth-first search, minimum spanning trees, and shortest path algorithms.
* Introduce computational complexity and P & NP concept.

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# **Main Topics**

* Review of basic data structures
* Analysis of algorithm efficiency
* Hash, heap, and tree
* Brute-force algorithm design technique
* Divide-and-conquer
* Decrease-and-conquer
* Transform-and-conquer
* Space and time tradeoffs
* Graph algorithms
* Dynamic programming
* Greedy method
* Advanced topics, if time permitted

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# **Exams**

* Midterm-I: February 27 in class.
* Midterm-II: April 9 in class.
* Final: May 12 in class.
* All exams are closed book.
* Final exam will be comprehensive.
* A calculator is not necessary for the exam.
* No re-grading will be accepted one week after the graded assignment is returned to the students.
* No makeup exam will be allowed, except in extreme emergency cases. Students are advised to let the instructor know beforehand, if possible.

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# Quizzes

* Quizzes will irregularly be held in class or lab.
* Quiz date will be announced in advance a few days before the quiz.
* No re-grading will be accepted one week after the graded assignment is returned to the students.
* No makeup for a quiz.

# **Homework**

* Problem solving and programming assignments will be given throughout the semester.
* Submission after the deadline is not accepted.
* No re-grading will be accepted one week after the graded assignment is returned to the students.

# Grading Policy

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| --- | --- |
| Midterm-I | 15% |
| Midterm-II | 15% |
| Final Exam | 15% |
| Quiz | 10% |
| Homework | 45% |

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| **Grade** |  |  |
| A+ | 100 | 94 |
| A | 94 < | 90 |
| A– | 90 < | 87 |
| B+ | 87 < | 84 |
| B | 84 < | 80 |
| B– | 80 < | 77 |
| C+ | 77 < | 73 |
| C | 73 < | 67 |
| D | 67 < | 57 |
| F | 57 < | 0 |

# Attendance

Students are expected to be regular and punctual in class attendance. Students are responsible for all materials covered in the lectures. If you miss **four times** in the lectures, you will get **10% cut** from **your final grading**. After that, you will continue to receive **an additional 5% cut for a following miss**.

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# Note to Students with Disabilities

Students with disabilities who may need accommodations please see the instructor as soon as possible during office hours or make an appointment by calling 582-3602 or by email ybyun@csumb.edu. Also, contact:

Student\_Disability\_Resources@csumb.edu

Building 80, Health and Wellness Services

Phone: 831/582-3672 voice, or 582-4024 fax/TTY

http://csumb.edu/sdr

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# Academic Integrity Policy in This Class

Cheating of any kind will not be tolerated at all in this class. You are responsible for your own original work on all assignments, homework, programming exercises, quizzes, and exams. Two or more students who submit extremely similar code or solution(s) will receive a zero score on the assignment or exam. Furthermore, the students will be reported to the academic dishonesty board. There are continual checks of the assignments to be sure that everyone is handing in original code. For more detailed information, refer to https://csumb.edu/policy/academic-integrity-policy.