California State University, Los Angeles
Computer Science Department
CS 3112 Data Structures and Algorithms
(Fall 2021)

COURSE INFORMATION

Instructor Information
Instructor: Yuqing Zhu
Office Location: E&T A317
Telephone: (323) 343-4572
Email: yuqing.zhu at calstatela dot edu
Office hours: M/W 9:30PM-11:00PM; by appointment
Class Days/Time: M 3:05AM-4:20PM Lecture
                      W 3:05AM-4:20PM Lab
Classroom: Hybrid (Only Midterm is face-to-face)
Prerequisites: CS2013, Math 2108, Math 2148 and Math 2170

Course Description
Abstract data types and their use in constructing algorithms for manipulating lists, trees, and graphs; analysis of algorithms for searching, sorting, and data structure manipulation.

Course Objectives/Outcomes
The Student Learning Outcomes that are addressed by the course are:
    SLO #1. Students will be able to apply concepts and techniques from computing and mathematics to both theoretical and practical problems.
    SLO #2. Students will be able to demonstrate fluency in at least one programming language and acquaintance with at least three more.
    SLO #3. Students will have a strong foundation in the design, analysis, and application of many types of algorithms.
    SLO #5. Students will have the training to analyze problems and identify and define the computing requirements appropriate to their solutions.

REQUIRED COURSE MATERIALS

Textbook
Introduction to Algorithms (3rd Edition). By: Cormen, Leiserson, Rivest and Stein. MIT Press.

Other Readings
Richard Johnsonbaugh, Marcus Schaefer. Algorithms. Prentice Hall, 2004.

Other equipment / material requirements (optional)

You are required to access lecture materials on CSNS learning management system. You will need to have an up-to-date browser, operating system and Adobe Acrobat Reader software on your computer. Documents in this course will be available to you in PDF form.

COURSE POLICIES

Course Structure

- CS3112 course is being structured in a hybrid format where the online component is greater than 90%. The hybrid format will allow the students to assimilate the concepts and complete most of the activities in a self-paced fashion. You will participate in the course using CSNS. The key to success is to keep up with the regular pattern described in the course structure.
- A typical weekly flow will be as follows:
  - (i)   A virtual class to introduce the concepts.
  - (ii) Download PowerPoint file ahead to time.
  - (iii) Watch the posted Video lectures. (The biggest facilitator in this format are the captioned videos generated over PowerPoint presentations that simulate classroom lectures. These videos can be replayed back many times to digest the concepts covered in the course.)
  - (iv) Refer and read the Chapter/Section in the textbook.

Computer Requirements

You are required to use your computer (a desktop or laptop) to complete project assignments. Your computer should have Java development kit installed. You are required to submit your assignments (programs or documents) via CSNS learning management system. You are required to install an image viewer for PPM file formats such as Irfanview to view sample image test data. Check the ITS Helpdesk Student Resources page for available software.

ASSIGNMENTS AND GRADING POLICY

There will be two kinds of assignment: written assignments and programming assignments.

Written assignments should be written or typed neatly on standard sized paper (8.5 x 11 inch), possibly in black or blue ink (please do not use red) and submitted at the due date (no electronic submissions accepted unless stated otherwise in class). Each page should be numbered. Late submissions will not be accepted.

For each programming assignment, you must submit a report to CSNS containing the running result of your code at the due date.

Grading Criteria

Points Possible

Assignment	Percentage
Midterm Exam	15%

Assignment	Percentage
Final Exam	15%
Assignments (9-10)	70%
Total:	**100%**

Grading Scale

Letter Grade	Percentage
A	90% and above
B	75% and below 90%
C	60% and below 75%
D	50% and below 60%
F	Below 50%

Grades

Grades for each assignment will be emailed via CSNS as soon as grading is finished. Any grading issues must be communicated through email with the instructor. Please do not post any grading concerns in a discussion forum.

COURSE COMMUNICATION

Interaction with Instructor

The Instructor will make every effort to communicate frequently with students through announcements and postings within the CSNS site. Post any questions or comments you have about the course content and/or requirements in the CSNS course forum. Questions of a more personal nature can be sent to the Instructor via email.

Netiquette

When posting on the discussion boards and chat rooms it is important to understand how to interact with one another online, *netiquette*. You can read more about the rules of netiquette at 15 Rules of Netiquette for Online Discussion Boards

HELPFUL STUDENT RESOURCES

Technical Resources

Information on CSULA technical support resources for students: Technical Support

Student Support Services

Information on CSULA student support resources for students: Student Services

Academic Support Services

Information on CSULA academic support resources for students: Academic Support

COURSE & UNIVERSITY POLICIES

Student Handbook
Information on student rights and responsibilities, academic honesty, standards of conduct, etc., can be found in Schedule of Classes for the current quarter visit the Cal State LA Schedule of Classes Information under Policies and Procedures.

Dropping and Adding
Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc. Students should be aware of the current deadlines and penalties for adding and dropping classes by visiting the GET home page. (Registrar news and information)

Americans with Disabilities Act (ADA)
Reasonable accommodation will be provided to any student who is registered with the Office of Students with Disabilities and requests needed accommodation. For more information visit the Office for Students with Disabilities home page.

Academic Honesty/Student Conduct
All work you submit must be your own scholarly and creative efforts. Any act of using ideas, words, or work of another person or persons as if they were one's own is considered as cheating. Cheating will not be tolerated. Cheating on any assignment or exam will be taken seriously. All parties involved will receive a grade of F for the course and be reported to the University Official. Check Appendix E - Student Conduct / Student Conduct Procedures to see student code of conduct in Cal State LA.

Course Outline/Schedule of Assignments

Schedule
This schedule is subject to change. Any changes will be notified in the class room and via email and CSNS. Up-to-date schedule is maintained on CSNS.

Week	Topic	Assignments/Activities:
1	Definition of Algorithms. • Euclid's Algorithm • Sieve of Eratosthenes	
2	Data Structures • List, Stack, Queue • Adjacency matrix • Adjacency list	
3	Sorting • Insertion Sort • Analysis of Insertion Sort	

Week	Topic	Assignments/Activities:
4	Analysis of Algorithms • Best case and worst case of Insertion sort	
5	Exercise of Analysis of Algorithms	
6	Growth of Functions • Big O, small o, big Ω, small ω • Stirling's approximation	
7	Divide and Conquer • Maximum Subarray Problem	
8	Review of Midterm	Midterm
9	Divide and Conquer • Recursion Tree • Master's Theorem	
10	Probabilistic Analysis and Randomized Algorithms • The hiring problem • Randomly Permuting an array	
11	Sorting (continued) • Heapsort • Quicksort	
12	Sorting in Linear Time • Couting sort • Radix sort • Bucket sort	
13	Stability of sorting	
14	Graph Algorithms	
15	Binary search trees and elemetrary graph algorithms	Review of Topics for the final exam (Q&A)
Finals		**Prepare for Class**: You are required to review lecture slides, your midterm exams, and sample questions for the final exam.