California State University, Los Angeles
Computer Science Department
CS 3112 Data Structures and Algorithms
(Fall 2019)

COURSE INFORMATION

Instructor Information
Instructor: Yuqing Zhu
Office Location: E&T A327
Telephone: (323) 343-4572
Email: yuqing.zhu at calstatela dot edu
Office hours: MW 2:00PM-3:30PM; by appointment
Class Days/Time: M 11:00AM-12:30PM Lecture
W 11:00AM-13:00PM Lab
Classroom: ET A309
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

Other Readings
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

You are not allowed to have make-up exams, late submissions, or incompletes. Your classroom participation and attendance will count towards your final grade. See the grading policy below. Your classroom participation are your discussions with your peers and presentations for the classroom activities. Your attendance will be checked in the beginning of every class. To be considered in attendance, you must be present in the class for at least one half of the class time. If you missed classes more than 4 times, you will not receive any credit for participation or attendance. If you missed classes more than 7 times (25% of the classes), you will receive a F. No cell phone usage is allowed during the class/exams.

Course Structure
This course is to be conducted entirely face-to-face lectures. You will participate in the course using a CSNS learning management system.

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.
Programming assignments must be presented to the instructor in the lab class at the due date.

Grading Criteria

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Two Midterm Exams</td>
<td>20%+20%</td>
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<tr>
<td>Final Exam</td>
<td>30%</td>
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<tr>
<td>Assignments (9-10)</td>
<td>30%</td>
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<tr>
<td>Total:</td>
<td>100%</td>
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</tbody>
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Grading Scale

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>90% and above</td>
</tr>
<tr>
<td>B</td>
<td>70% and below 90 %</td>
</tr>
<tr>
<td>C</td>
<td>60% and below 70 %</td>
</tr>
<tr>
<td>D</td>
<td>50% and below 60%</td>
</tr>
<tr>
<td>F</td>
<td>Below 50%</td>
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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.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Assignments/Activities:</th>
</tr>
</thead>
</table>
| 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 |
| 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    | Review of Midterm | Midterm A |
| 8    | Divide and Conquer | • Maximum Subarray Problem |
| 9    | Divide and Conquer | • Recursion Tree  
                      • Master’s Theorem |
<table>
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<th>Week</th>
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<th>Assignments/Activities:</th>
</tr>
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</table>
| 10   | Probabilistic Analysis and Randomized Algorithms  
• The hiring problem  
• Randomly Permuting an array |                      |
| 11   | Review of Midterm | Midterm B               |
| 12   | Sorting (continued)  
• Heapsort  
• Quicksort |                      |
| 13   | Sorting in Linear Time  
• Counting sort  
• Radix sort  
• Bucket sort |                      |
| 14   | Stability of sorting |                      |
| 15   | Binary search trees and elementary 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. |