CECS 274 Data Structures

California State University, Long Beach

(Fall 2020)

1 Overview

- **Instructor's name:** Oscar Morales Ponce
- **Office number:** ECS-543
- **E-Mail address:** Oscar.MoralesPonce@csulb.edu
- **Lecture:** Fr 8:00am–9:50am
  - https://csulb.zoom.us/j/91415182687?pwd=MHJEcGNrT2d5OCtTbjFyMWhtWmN4QT09
  - Password: 42145
- **Office hours:** We 1:30pm–3:00pm
  - https://csulb.zoom.us/j/97022786467?pwd=OUNiRk9XVFRFTDE4NDNqa0UrSXFLQT09
  - Password: 42145
- **Office hours:** Th 9:00am-10:30am
  - https://csulb.zoom.us/j/96808831502?pwd=Q2NBdW5wZUpMS0daUjBEamZWK0xPZz09
  - Password: 42145
- **Prerequisite:** CECS 174 with a grade of "C" or better.
- **Mode of instruction:** Online-synchronous (Attendance is required)

2 Course Description

Have you ever thought about how Google handles millions of queries per second?
Were you ever curious about how Facebook makes suggestions of friends?
In this class, we will have an opportunity to learn fundamental concepts to handle data efficiently. In particular you will learn how Abstract Data type (ADT) are designed and implemented. ADT are the key piece of software that big companies such as Google, Facebook, Amazon, etc, use to provide very efficient services.

Topics will include Queues, Stacks, Lists, Trees, Heaps, Sorting algorithms, Graphs.

CECS 274 is a VERY Challenging course and requires high level of logic precision. Please have the correct expectation and put a high amount of effort to the course.

Attendance to EVERY class is required - missing one single class would mean tremendous difficulty in catching up, and missing two classes would very likely mean failing the course.

3 Catalog Description

CECS 274 - Data Structures
(3 units)

Prerequisite: CECS 174 with a grade of "C" or better.
Data Structures. Topics include lists, hash tables, binary trees, balanced trees, heaps, sorting-algorithms, graphs, external memory searching.

Letter grade only (A-F). (Lecture 2 hours, laboratory 3 hours). Same course as CECS 274H. Not open for credit to students with credit in CECS 274H.

4 ABET Student Outcomes

The course satisfies following ABET for CS student outcomes:

- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program?s discipline.
- Apply computer science theory and software development fundamentals to produce computing-based solutions.

5 Objective learning outcomes

To take charge of your own education, you must be willing to read the texts, ask questions, actively engage in discussions, and struggle with practice prob-

lems. Every mistake you make, every question you ask, and every time you successfully solve a problem on your own, your brain grows a little bit stronger and smarter. Your efforts to involve in all of these aspects of learning will help to prepare you for the workforce and/or further scientific studies.

At the conclusion of the course the students will be able to:

CLO 1. Identify the fundamental data structures in computer science and their use in real-life applications

CLO 2. Evaluate the running complexity of a data structure

CLO 3. Develop problem solving skills by implementing data structures

CLO 4. Compare advantages and disadvantages of different data structure implementations

CLO 5. Design and analyze composite data structures

6 Course Structure and Delivery Mode

This course is conducted entirely online. You will access the course material and activities on BeachBoard and are required to participate in synchronous class meetings via Zoom.

If you need technical assistance at any time during the course or need to report a problem with BeachBoard, please contact the Technology Help Desk using their online form, by phone at (562) 985-4959.

7 Course Communication

We will use BeachBoard to make announcements, communicate information, post assignments and corresponding due dates, and discuss course-related topics. Please note, it is your responsibility to check BeachBoard?s dashboard regularly, as it will contain important information about upcoming class assignments, activities, or concerns.

You may access BeachBoard directly at `https://bbcsulb.desire2learn.com/d2l/login` and log in with your CSULB campus ID and password. You may also access it via Single-Sign-On page at `https://csulb.okta.com/`. Once logged in, you will see the course listed under "CECS 274 Sec 01 4036 Obj Oriented Prog". Click on the title to access the course page.

8 Textbook

-Morin, Pat. *Open Data Structures.* (2014).

9 Prerequisites to Succeed in the Course

The emphasis of CECS 274 is on problem solving. The course requires basic concepts of at least one programming language such as Python, Java or C++ to implement the labs and assignments. These concepts should have been covered in CECS 174 or an equivalent class. In particular, you are required to be comfortable with:

- Loops including **for loops** and **while loops**
- Variables and Data Types including **integers, floating point**, and **strings**
- Conditional Statement including **if** and **if else** statements
- Arrays
- Functions
- Input and output of the program.
- Programming style including classes and modules

All the lab assignments must be implemented in Python 3.8 or higher. A good reference is found at https://docs.python.org/3/tutorial/index.htm (Section 1, 2, 3, 4, 6,7,9).

10 Contact me

The best way to reach me is by email Oscar.MoralesPonce@csulb.edu. In most of the cases you can expect the response within 24 hour.

11 Minimum Technology Requirements

To fully participate in this course, you will need equipment and a computer system with internet connection and headphones and :

- Plug-ins: Adobe PDF Reader
- Browser: Firefox, Chrome, Internet Explorer 10 or higher, Safari
- Be comfortable using and navigating within the learning management system (BeachBoard)

- Create and submit files using a commonly used Integrated Development Environment IDE
- Uploading documents to the learning management system (BeachBoard)
- Downloading and installing software

Please contact the department if you need support with access to the Internet, electronic devices, or any other issues related to remotely accessing your course.

12 Netiquette

When composing an email

- Use a descriptive subject line that is appropriate to the subject and easy to understand
- Keep your email brief but specific
- Spell check and proof read before sending
- Do not use capitalization, as it may seem like you are shouting and set the wrong tone
- Keep your email organized
- Always use a professional tone
- Avoid attachments unless you are sure your recipients can open them
- Think before you send the email to more than one person. Does everyone really need to see your message?
- When replying to all, make sure you REALLY want everyone to receive your response and ask yourself if it is necessary for everyone to see the message.
- Before passing along a message and selecting the ?forward? button, make sure that the original author intended for the information to be passed along.
- Sign your message with your name and return email address

When discussion Board Assignments

- Stay on topic and don't post things that are irrelevant
- Do not type in all CAPS! This could set the tone as if you are screaming
- Do not write anything that sounds angry or sarcastic

- When asking for your classmates help, always remember to have manners and say please.
- Acknowledge that others have their own perspective on issues, therefore respect others perspectives and if you feel the need to disagree, do so respectfully and in a non-critical way.
- Do not provoke or badmouth other classmates, you may disagree respectfully, but do not mock the person.
- If you refer to something your classmate said, make sure to quote just a few key lines from their post, so that others will know what you are referring to.
- When referencing another source give credit to that source.
- Check the most recent comments before you reply and make sure that you are replying to the most recent comment.
- Perform a spelling and grammar check before posing to the discussion board.
- Review and edit your post before publishing
- Your post should be relevant to the topic
- Develop a well thought out reply to a thread and avoid replies such as, "I agree" or "I disagree". However, if you do include "I agree" or "I disagree", provide in detail why you agree or disagree.

13 Tentative Schedule of Activities

Date	Topic	Activity
Aug 28	Syllabus and Introduction	Installation of IDE in your computer for your labs and complete the activities of in "Start Here"
Sep 4-11	Array-Based Lists	Implementation of the Stack, Queue, and List interfaces using Arrays. Application: Book store system and calculator
Sep 18-25	Linked Lists	Implementation of the Stack, Queue, and List interfaces using Single and Double Linked-List: Book store system
Oct 2-9	Hash Table	Implementation of the Unsorted Set (Dictionary) interface using ChainedHashTable. Application: Book store system and Calculator
Oct 16-23	Binary Trees	Implementation of the Sorted Set interface using Binary Trees. Application: Book store system and Calculator
Oct 30	Heaps	Implementation of the Priority Queue interface using BinaryHeaps. Application: Book store system
Nov 6	Sorting Algorithms	Implementation of MergeSort and QuickSort Algorithms. Application: Book store system
Nov 13-20	Graphs	Implementation of Graphs using AdjacencyMatrix and AdjacencyList. Implementing graph traversals: BFS and DFS. Application: Book store systemk
Nov 27	Thanks Giving	
Dec 4	Advanced topics	Red-Black Trees
Dec 11	Class review	
Dec 18	**Final Test**	

14 Assignments

To reinforce your theoretical knowledge, you must be willing to work on several practical lab project. These practice problems allow you to examine your own understanding of the topics – catch up if you cannot fully grasp

the materials in class, reinforce the concepts if you have no trouble absorbing the materials in class, and most importantly, stimulate your mind to pose further, deeper questions to be investigated.

Each assignment is develop to practice the theory. Assignments are individuals. You can share ideas but sharing code is NOT ALLOWED. Plagiarism will be SERIOUSLY TREATED.

You can expect the feedback of the assignments from the TA in your lab in at most 2 weeks.

15 Quizzes and Exams

Quizzes and the final exam are designed to assess your mastery of core concepts presented in class, practice problems, and readings. They are written at a level for you to be successful. **No make up quizzes or final exam will be given.** You will receive the grade of your quizzes and final exam. You can consult your progress grade under the Grade tab on Beachboard.

15.1 Quizzes

Each quiz consists of one or two questions and you will have 7 minutes to complete it. Please make sure you submit the quiz. There is a quiz the next day after the completion of a topic. The quiz with the lowest grades will be dropped.

15.2 Exams

There is a final exam that covers all the course material.

Final Exam: Friday, Dec 18, 10:15am-12:15pm

16 Attendance and Participation

Every time that you ask questions and make an effort to answer questions, your brain grows a little bit stronger and smarter. Not only class and lab time are important time to solve doubts or when you are struggling, but also the office hours. All of these will account for participation.

Attendance (joining the online class) and Participation (being alert and available if inquired by the instructor in contrast to being just online but

unresponsive) are essential to your success in this class. In distance education courses you are required to attend and participate just as if you were in a face-to-face course. Therefore, attendance will be taken every session and the participation will be checked randomly during class, lab or both or more unexcused absences during the class will cause -7% of the total grade.

17 Discussion Forum

In an online course it is normal to have many questions about things that relate to the course, such as clarification about assignments, course materials, or assessments. Please post these in the Module Forum which you can access by clicking the DISCUSSIONS button in the course navigation links. This is an open forum, and you are encouraged to give answers and help each other. For each clear and comprehensive answer that you give, you can receive 1 extra credit point for the course (up to 5 points maximum). Please do not post your personal concerns in a discussion forum. In most of the cases you can expect the answers within 72 hour for question that other students cannot answer.

18 Grading

Evaluation: Grades are designed to measure the level of your understanding against the learning objectives. They are not indicators of your smartness nor goodness of fit; rather, indicators of your efforts by the time the exams are taken.

Grading scale: A: $90-100$; B: $80-89$; C: $70-79$; D: $60-69$; F: $0-59$. The final grading is based on the following activities and weights:

No extra work will be given.

Activity	Weight
Labs	28 points
Quizzes	30 points
Final exam	25 points
Participation	17 points
Introduce yourself	3 points
Discussion Forum	5 points
Assistance	9 points

19 Regrades

If you believe that an error was made in the grading of your assignments, lab projects or exam, you may request a regrade from me during the office hours in no more than a week after the assignments, lab projects or exam has been returned. **No request for regrades will be considered by e-mail or after the deadline.**

20 Assessment Due Date and Weight

Assessment	CLO	Due Date	Final grade weights
Discussion Forum	N /A	-	5
Introduce yourself	N/A	Sep 31	3
Attendance	N/A	-	9
Quiz 1: Introduction	CLO 1	Sep 4	3.75
Quiz 2: ArrayBased	CLO 1, 2, 4	Sep 18	3.75
Lab 1: ArrayBased List	CLO 1, 3, 4	Sep 25	4
Quiz 3: Linked-List	CLO 1, 2, 4	Oct 2	3.75
Lab 2: Linked-List List	CLO 1, 3, 4	Oct 9	4
Quiz 4: HashTables	CLO 1, 2, 4	Oct 16	3.75
Lab 3: HashTables List	CLO 1, 3, 4, 5	Oct 23	4
Quiz 5: Binary Trees	CLO 1, 2, 4	Oct 30	3.75
Lab 4: Binary Trees	CLO 1, 3, 4,	Nov 6	4
Quiz 6: Heaps	CLO 1, 2,4	Nov 6	3.75
Lab 5: Heaps	CLO 1, 3, 4	Nov 13	4
Quiz 7: Sorting	CLO 2	Nov 13	3.75
Lab 6: Sorting	CLO 3, 4	Nov 20	4
Quiz 8: Graphs	CLO 1,2, 4	Nov 27	3.75
Lab 7: Graphs	CLO 1, 3, 4,5	Nov 27	4
Quiz 9: Advanced Topics (Red-black Trees)	CLO 1,2, 4	Dec 11	3.75
Lab 8 Bonus Point: Red-black Trees	CLO 1, 3, 4	Dec 15	4
Final Exam	CLO 1, 2,4,5	Dec 18	25

21 Withdrawal Policy

Students are allowed to withdraw the course within the first two weeks of the course by following the university's official withdrawal procedures. Late withdrawal will result in a grade of "U". Late withdrawal is permitted only under serious and compelling reasons at discretion of the instructor and department chairperson. Students are strongly advised to consult the university's withdrawal policy at Withdrawal Policy

22 Attendance

Attendance to EVERY class is required - missing one single class would mean tremendous difficulty in catching up, and missing two classes would very likely mean failing the course. Given the discussion-based nature of this class, daily attendance is expected, as many discussions and activities are nearly impossible to replicate outside of class. I understand that sometimes 'life happens' and you are forced to make decisions between class and those 'life events,' but please know that your decisions will have consequences. In principle, you won't have any participation point if you miss any three quizzes or surveys.

It is compulsory to attend the first two weeks of classes. Failing to attend will result in the withdrawal of the course. Students are strongly advised to consult the university's attendance policy. Attendance Policy.

23 Disability Accommodation

Online courses are required to meet ADA accessibility guidelines. Students with a disability or medical restriction who are requesting a classroom accommodation should contact the Bob Murphy Access Center (BMAC) and also notify the instructor. BMAC personnel will work with the student to identify a reasonable accommodation in partnership with appropriate academic offices and medical providers. Only approved BMAC petitions will be accommodated. We encourage students to reach out to DSS as soon as possible.

24 Students who need assistance

Any student who is facing academic or personal challenges due to difficulty in affording groceries/food and/or lacking a safe and stable living environment is urged to contact the CSULB Student Emergency Intervention & Wellness Program. The website outlining the resources available is www.csulb.edu/basicneedss. Students can also e-mail supportingstudents@csulb.edu or call 562/985.2038. If comfortable, students may reach out to the professor as they may be able to identify additional resources. For mental health assistance please check out Counseling and Psychological Services (CAPS).

25 Cheating and Plagiarism

Cheating and plagiarism will not be tolerated in this course. Any individual caught cheating on quizzes, homework, lab projects, or exams will be punished to the full extent allowed under University regulations. Plagiarism on papers or assignments is not acceptable and work that is plagiarized will not receive credit. Plagiarism is considered cheating. Note: any time another person's work is used without giving them proper credit, it is considered plagiarism and cheating. At a minimum, any student caught cheating will receive no credit for the work concerned, and will receive a reduction of one letter grade from their final course grade. Students must submit only original work, including quizzes, homework, lab projects, and exams. Students are NOT ALLOWED to copy from the Internet, copy from other students, receive help that required individual effort. The official CSULB Policy on Cheating and Plagiarism can be found here: Cheating and Plagiarism.

26 COE Tutoring Services Available for Major Classes

The College of Engineering Tutoring Center offers free tutoring for many lower and upper division engineering courses in MAE, CECS, CECEM, CHE and EE. Tutors are available Monday through Friday during the fall and spring semesters between the hours of 9:00am-6:00pm in EN2-300. Visit the following website for detailed tutoring schedules: Virtual tutoring center

27 Student Grievance Policy

Please check CSULB grievance policy and procedure at:

https://www.csulb.edu/academic-senate/policy-statement-07-01-student-grievance-procedures%C2%A0superseded-ps-95-21

Student Grievance Procedures

28 Additional Resources

There are many services on campus to help you achieve success in your courses. Links to the following services are also available in BeachBoard

course homepage under "CSULB Student Resources":

Counseling and Psychological (CAPS)
Disabled Student Services
Enrollment Services
Financial Aid
Learning Assistance Center
Student Health Services
Tutoring at CSULB
University Library
Writers Resource Lab

29 Disclaimer

In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.