

CSc 130 - Data Structures and Algorithm Analysis

3 Credits

Fall 2020

- *Administrative Information*

1. **Instructor:** Hady Ahmady Phoulady
2. **Department:** Computer Science
3. **Meeting Time and Location:** Monday/Wednesday/Friday, 11:00am - 11:50am - Online
4. **Office Hours:** Online on Zoom: Monday/Wednesday/Friday, 12:00pm - 1:00pm; or by appointment
Zoom meeting: <https://csus.zoom.us/j/96411569926>
5. **E-Mail:** phoulady@csus.edu

- *Course Description*

- Specification, implementation, and manipulation of data structures: linear/lists, stacks, queues, trees, sets, and graphs. Design and analysis of algorithms: searching, sorting, hash tables, and graph algorithms. NP-completeness.

- *Prerequisites*

CSc 20 and CSc 28 (may be taken concurrently).

- *Textbooks*

Required: “Introduction to Algorithms”, 3rd Edition, by Thomas Cormen, Charles Leiserson, Ronald Rivest and Clifford Stein, MIT Press, 2009.

Other suggested references:

- “Algorithms”, 4th Edition, by Robert Sedgewick and Kevin Wayne, Addison-Wesley, 2011.
- “Algorithm Design”, by Jon Kleinberg and Éva Tardos, Pearson, 2006.
- “The Algorithm Design Manual”, 2nd Edition, by Steven Skiena, Springer, 2012.
- “Introduction to the Design and Analysis of Algorithms”, 2nd Edition, by Anany Levitin, Pearson, 2007.

- *Grading*

- *Grading Rubric*

1. Participation: 5%;
2. Quizzes: 30%;
3. Midterm: 30%;
4. Final Exam: 35%;

- *Grading Scale*

Your weighted average for the course, using the above rubric, must be greater than or equal to **<avg>** in order to receive a grade of **<grade>**.

<avg>	<grade>
90.0%	A
80.0%	B
70.0%	C
60.0%	D
0%	F

- The instructor **reserves the right** to make adjustments to the grading scale based on class averages.
- The instructor **reserves the right** to make adjustments to students' grades based on their attendance, participation in discussions, or progress.
- The instructor **reserves the right** to use the +/- grading system.

- *Course Policies & Procedures*

- *Quizzes*

- * Short quizzes will be given throughout the course at the beginning of some classes.
- * Often, each quiz includes one of the lectures listed below, and it will be given after the last class we finish covering a lecture (not necessarily exactly right after the last class).
- * Depending on the class pace, we may skip some lectures. This will be discussed in class as we cover the material.
- * The lowest quiz grade will be dropped. If more than 5 quizzes are given, two lowest grades will be dropped.
- * Requests for make-up will not be entertained.

- *Exams*

- * Requests for make-up examinations will not be entertained. I will only make exceptions to this policy in case of excused absences. You must provide sufficient documentation to prove that your absence is excused.
- * The date provided for the exam is tentative. Changes to an exam date will be announced in-class at least one week prior to the exam.
- * The final exam is cumulative.

- *Homework Assignments*

- * For each lecture, a homework assignment with a set of solutions will be made available on Canvas.
- * The assignments will not be graded. However, you are strongly encouraged and expected to work on the homework questions like if they were going to be graded!
- * Do not look at the solutions until you solve or work sufficiently on each problem (so, basically, look at the solutions just to confirm your answer to the problem or in case you could not solve the problem).
- * You can usually start working on an assignment after we start covering the related topic.
- * It is expected that each student finishes working on every assignment by the day after the last class that we finish covering the lecture.
- * Although the assignments will not be graded, you are encouraged to work on them as if you want to submit your solutions to be graded by a deadline (a day after the last class of each lecture).
- * **Take the homework assignments seriously!**

- *Regrade Policies*

- * Regrade requests must be submitted, in writing, to the instructor **within seven calendar days** of either: (1) the date the graded material is returned in class or (2) the date the grades are posted on Canvas, whichever occurs first.
- * Regrade requests must be written on a separate sheet of paper and must be attached to your original submission.
- * Regrade requests must specify the question(s) or parts to be regraded. Regrade requests must include a brief description of why the question(s) or parts should be regraded.
- * The instructor reserves the right to regrade the entire submission.
- * Graded material which has been modified in any way since it was returned to the student will not be regraded.

- *Attendance Policies*

- * Students are expected to **attend all classes**.

- * The participation grades for students are computed based on each student's attendance and also the level of participation in discussions in class.
- * You are responsible for all material presented during each lecture. Material presented during the lectures may not be in the textbook or the uploaded notes/slides.
- * Students who anticipate the necessity of being absent from class due to the observation of a major religious observance must provide notice of the date(s) to the instructor, in writing, by the second class meeting.
- Hand-written work must be legible. If your work is illegible it will not be graded (i.e., you will earn a grade of 0).
- The instructor reserves the right to interpret the class policies if confusions occur.

Avoid excessive collaboration on individual assignments. A healthy amount of discussion between students is a valuable part of learning. But it is not acceptable to collaborate in developing the details of a solution, unless the assignment is a team project.

- *Academic Integrity/Academic Dishonesty*

Computer Science students are required to adhere to campus and departmental guidelines for academic integrity. Campus guidelines are outlined in the CSUS University Policy Manual on Academic Honesty (<https://www.csus.edu/umannual/student/stu-0100.htm>). The following is additional information specific to Computer Science courses.

Avoid Cheating!

- *Avoid excessive collaboration on individual assignments.* A healthy amount of discussion between students is a valuable part of learning. But it is not acceptable to collaborate in developing the details of a solution, unless the assignment is a team project.
- *Do not give answers to other students.* Giving fellow students answers they were supposed to determine on their own is cheating. Doing so also deprives them of the learning experience of reaching a solution through their own efforts.
- *Keep all printouts, diskettes, notes, etc. secure,* so that other students will not find them and use your solutions in their work. This also includes shared network drives, printer queues, temporary directories in lab workstations, etc.
- *Limit discussion to high-level concepts.* Discussing concepts, assignment requirements, syntax errors, coding tricks, or programming environments is generally encouraged. When discussion involves specific code or solutions, it may cross the line into cheating.
- *Always stop and think before copying or emailing any source code.*
- *Ask your instructor if you are unsure.* Students who are unsure whether their activities might be considered cheating are encouraged to consult with their instructor. Openness can make a cheating instance considerably less flagrant than if it were covered-up.

- *Tentative Schedule*

- Lecture 1: Linear Search & Proofs
- Lecture 2: Asymptotic Analysis & Recursion
- Lecture 3: Sorting
- Lecture 4: Linear Sorting
- Lecture 5: Hash Tables
- Lecture 6: Stacks, Queues and Linked Lists
- Lecture 7: Heaps
- Lecture 8: Binary Search Trees (and Red Black Trees)
- Lecture 9: Graph Algorithms (BFS, DFS and Topological Sort)
- Lecture 10: Shortest Paths
- Lecture 11: Minimum Spanning Trees
- Lecture 12: NP-Completeness

- *Exams*

- Midterm: Lectures 1–5
- Final Exam: Cumulative

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Aug 31st 1 Orientation, Lecture 1	Sep 1st	2nd 2 Lecture 1 (cont.)	3rd	4th 3 Lecture 1 (cont.)
7th <i>Labor Day</i>	8th	9th 4 Lecture 2	10th	11th 5 Lecture 2 (cont.)
14th 6 Lecture 2 (cont.)	15th	16th 7 Lecture 2 (cont.)	17th	18th 8 Lecture 3
21st 9 Lecture 3 (cont.)	22nd	23rd 10 Lecture 3 (cont.)	24th	25th 11 Lecture 3 (cont.)
28th 12 Lecture 3 (cont.) ⁴	29th	30th 13 Lecture 4	Oct 1st	2nd 14 Lecture 4 (cont.)
5th 15 Lecture 4 (cont.)	6th	7th 16 Lecture 5	8th	9th 17 Lecture 5 (cont.)
12th <i>Columbus and Indigenous People's Day</i>	13th	14th 18 Lecture 5 (cont.)	15th	16th 19 Lecture 5 (cont.)
19th 20 Midterm	20th	21st 21 Lecture 6	22nd	23rd 22 Lecture 6 (cont.)
26th 23 Lecture 7	27th	28th 24 Lecture 7 (cont.)	29th	30th 25 Lecture 7 (cont.)

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Nov 2nd 26 Lecture 8	3rd	4th 27 Lecture 8 (cont.)	5th	6th 28 Lecture 8 (cont.)
9th 29 Lecture 9	10th	11th <i>Veteran's Day</i>	12th	13th 30 Lecture 9 (cont.)
16th 31 Lecture 9 (cont.)	17th	18th 32 Lecture 10	19th	20th 33 Lecture 10 (cont.)
23rd No Class	24th	25th No Class	26th <i>Thanksgiving Break</i>	27th <i>Thanksgiving Break</i>
30th 34 Lecture 10 (cont.)	Dec 1st	2nd 35 Lecture 11	3rd	4th 36 Lecture 11 (cont.)
7th 37 Lecture 11 (cont.)	8th	9th 38 Lecture 12	10th	11th 39 Review