

CSCI 230

Data Structures and Algorithms

Fall 2019

Instructor: Xenia Mountrouidou (Dr. X)
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Office: Harbor Walk East, Room 312
Office Hours: T/TH 10:00 – 12:00 or by appointment

Overview

This course reviews and develops the abstract data type as mathematical models. Data structures and algorithms are developed as the objects and operations of abstract data types. Topics include lists, stacks, queues, trees, graphs, searching, sorting, and analysis of the efficiency of algorithms. Lectures three hours per week.

Prerequisite(s): CSCI 221 with a grade of C- or better and MATH 207.

Outcomes

After completing CSCI 230 students will be able to:

1. Analyze algorithms using asymptotic analysis.
2. Distinguish between the notions of an abstract data type and physical data structure.
3. Apply stacks, queues, lists, trees, binary search trees, balanced binary trees, hash tables, heaps and priority queues, and graph ADTs in computer solutions.
4. Implement ADTs and appropriate operations on ADTs.
5. Be able to identify the advantages and disadvantages of the use of specific data structures in specific problem situations.
6. Distinguish between various sorting algorithms in terms of how they work and their efficiency in specific problem situations.
7. Apply written communication skills to produce one or more reports on one to two

pages on topics of data structures and algorithms.

Materials

Required book:

“Data Structures and Algorithms”, *Cliff Shaffer and David Parillo*. Available online at: <https://opensa-server.cs.vt.edu/ODSA/Books/CS2/html/>

Reading assignments and OpenDSA exercises will be taken from the textbook.

Software: .

1. Java: Eclipse or IntelliJ IDE
2. Slack for communication and participation
3. We will use Oaks (<https://lms.cofc.edu/>) for assignment submission and grading.

Class Meeting Times: T/TH 14:10 – 15:25 (Section 01),
T/TH 15:35 – 16:50 (Section 02)

Class Location: HWEA 302

Office hours – Dr. X: T/TH 10:00 – 12:00

Dr. X’s Office Location: HWEA 312

Office hours – Nate: M/T/W 13:00 – 18:00

Nate’s Office Location: HWEA 311

Course Website:

<http://mountrouidou.people.cofc.edu/CSCI230/index.html>

Course Slack Workspace:

- csci230f1901.slack.com

Evaluation

OpenDSA Assignments & Participation	5%
Programming Homework	25%
Quizzes	25%
Midterm Exam	20%
Final Exam	25%
Total	100%

Your weighted average will result in a letter grade assigned per the usual scale:

A: 93%-100% A-: 90%-93%

B+: 87%-90% B: 83%-87% B-: 80%-83%

C+: 77%-80% C: 73%-77% C-: 70%-73%

D+: 67%-70% D: 63%-67% D-: 60%-63%

F: below 60%

➤ **OpenDSA Assignments**

- ❖ You will have required readings every week.
- ❖ The book includes multiple choice review questions. Your “OpenDSA Assignments” grade will be based on the completion of these questions.

➤ **Programming Homework Assignments**

- ❖ This is a project-intensive class. Expect to spend a minimum of 10 hours per week working outside of class on the work for this class. If you start an assignment the day before the assignment is due, expect to miss the deadline.
- ❖ All assignments are **individual efforts** unless stated otherwise.
- ❖ Programming assignments will be based on your readings and will include the implementation of data structures, evaluation of algorithm performance, and rigorous testing of your code.
- ❖ Assignments will be submitted through OAKS or on paper at the start of class. Details of what each submission requires will be specified on the assignment.
- ❖ **Assignments submitted improperly will not be graded.**
- ❖ You will have approximately one homework assignment approximately every 2 weeks.

➤ **Quizzes, Tests, and Final Exam**

- ❖ You will have a quiz every two weeks that will include questions that require writing a program on a paper. We call this “white board coding” and it is very beneficial for coding interviews.
- ❖ There will be a cumulative final exam.
- ❖ Exams are closed book.
- ❖ *You may use one cheat sheet*, i.e., a US Letter page written in front and back.

➤ **Participation:**

- ❖ Participation will be the average of your attendance, Kahoot quizzes, and active in class participation.
- ❖ You need to actively ask and answer questions during class to earn active in class participation points.
- ❖ The participation points are dependent on my discretion based on your attention and active preparation.

Late Submissions

- Deadlines are firm.
- *A score of zero will be assigned to any project/homework that has not been submitted on the deadline.*

Re-grading

If you have a request for re-grading, you need to ask me to re-grade your exam or homework up to one week (five business days) after this has been returned to you. *There will be no re-grading if the exam/assignment is older than one week.* I reserve the right to re-grade the full exam/assignment. This means that I will not re-grade only the part you have requested, but the whole exam/assignment and add or reduce points accordingly.

Missed Exams

If you miss an exam, the only way to take this exam on a different day is to have an official document (ex. from doctor, coach) verifying the reason you had to miss the exam AND to let me know with an email BEFORE the exam, that you will miss it. Please refer to the student handbook “Class attendance policies” for a more detailed description of excused absences. A reason to miss the exam may be a health issue, a sports tournament you had to participate, or an important personal issue. I will consider rescheduling on a case-by-case basis.

Attendance

Regular attendance is expected of all students. For any grade to be awarded, participants must attend at least 85% of the class hours. Participants are expected to attend all sessions, ***be punctual***, and remain for the duration of each class. In the rare case where some absence is required, make up work will be assigned where it is practical to do so. Attendance is also part of the grading scale. Students may be withdrawn by the instructor if absences violate these guidelines.

Attendance policies

- ❖ You are expected to attend every day.
- ❖ You are expected to arrive on time.
- ❖ You are expected stay until the end of class, unless an emergency arises or you inform the instructor beforehand.
- ❖ Excused absences are accommodated. Documented sickness is excused – talk to the instructor if you miss due to sickness, even if you did not see a doctor.

- ❖ You are responsible for material, information and deadlines, whether or not you attend and whether or not your absence is excused.
- ❖ **Use of computers and other electronic devices is NOT allowed during class, without permission of the instructor.**

Schedule

- The schedule is tentative and subject to change during the semester.
- If the College of Charleston closes and members of the community are evacuated due to inclement weather, students are responsible for taking course materials with them in order to continue with course assignments consistent with instructions provided by faculty. In cases of extended periods of institution-wide closure where students have relocated, instructors may articulate a plan that allows for supplemental academic engagement despite these circumstances.

Week	Date	Topics	Readings due before class	Programming HW	Quiz
Week 1	Aug. 20	Introduction, Syllabus, ADTs	Syllabus		
	Aug. 22	OO Programming, List ADT	ch. 1, 2.1, 2.4		
Week 2	Aug. 27	List ADT	ch. 3		Q1 - ch. 1, 2
	Aug. 29	List ADT			
Week 3	Sept. 3	Algorithms	ch. 4	HW1 - List ADT	
	Sept. 5	Algorithms			
Week 4	Sept. 10	Single Linked List (SLL)	ch. 10		Q2 - ch. 3, 4
	Sept. 12	SLL			
Week 5	Sept. 17	Double Linked List (DLL)		HW2 - Algorithmic complexity	
	Sept. 19	DLL			
Week 6	Sept. 24	Stack	ch. 6		Q3 - ch. 10
	Sept. 26	Queue	ch. 9		
Week 7	Oct. 1	Recursion	ch. 7	HW3 - DLL	

	Oct. 3	Binary Search Trees (BSTs)			
Week 8	Oct. 8	Midterm			
	Oct. 10	AVL trees	ch. 11		
Week 9	Oct. 15	Fall Break - No classes			
	Oct. 17	AVL trees		HW4 - Stack, Queue, Trees	
Week 10	Oct. 22	Heaps and Priority Queues			Q4 - ch. 11
	Oct. 24	Sorting	ch. 8		
Week 11	Oct. 29	Sorting			
	Oct. 31	Sorting		HW5 - Sorting	
Week 12	Nov. 5	Hashing			Q5 - ch. 8
	Nov. 7	Hashing			
Week 13	Nov. 12	Hashing			
	Nov. 14	Graphs		HW6 - Hashing	
Week 14	Nov. 19	Graphs			Q6
	Nov. 21	Graphs			
Week 15	Nov. 26	Final Review		HW7 - Graphs	
	Nov. 28	No Classes - Thanksgiving			
Week 16		Final Exam - 14:10 section on Dec. 10, 16:00 - 19:00, 15:35 section on Dec. 5, 16:00 - 19:00			

Honor Code

Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when suspected, are investigated. Each incident will be examined to determine the degree of deception involved.

Incidents where the instructor determines the student's actions are related more to a misunderstanding will be handled by the instructor. A written intervention designed to help prevent the student from repeating the error will be given to the student. The intervention, submitted by form and signed both by the instructor and the student, will be forwarded to the Dean of Students and placed in the student's file.

Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XXF in the course, indicating failure of the course due to academic dishonesty. This status indicator will appear on the student's transcript for two years after which the student may petition for the XX to be expunged. The F is permanent.

Students should be aware that unauthorized collaboration--working together without permission-- is a form of cheating. Research conducted and/or papers written for other classes cannot be used in whole or in part for any assignment in this class without obtaining prior permission from the instructor.

Students can find the complete Honor Code and all related processes in the Student Handbook at <http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php>.

What is plagiarism?

The unauthorized use or close imitation of the language and thoughts of another author and the representation of them as one's own original work, as by not crediting the author. (*Source: dictionary.com*)

As you noticed above, I am citing the Internet source from which I used my information. Plagiarism includes using material from the Internet without citing the website from which you got your material. Books, articles and any hard copy sources should be cited as well. Plagiarism is considered cheating.

Plagiarism and coding (what you can and cannot do!):

1. You may look up examples on the Internet.
2. You may NOT copy paste code from the Internet and present it as your own. Avoid copy pasting code from the internet and use this as a last resort ALWAYS with citation to the website that you used.
3. You may use libraries that are included in the Java API.
4. If you plan to use a library that is not on the Java API in a project, you will need to discuss this with me.

Discussing solutions with other students: Make sure you apply the “**empty hand policy**”, i.e., do not copy or use material from the discussion, just interact, brainstorm. You *cannot look at someone's code and then type it*. You *cannot share the programs*, write code on a paper and share it with someone, or in any form whatsoever share your programs.

Collaboration in teams is allowed only if I have explicitly described in the project/homework assignment. You may collaborate based on the principles of pair programming (see below) and only if I have authorized teams. The Honor Code applies to the team members.

My actions after I suspect a cheating:

1. Contact the student and discuss the issue.
2. Consult with the honors committee and proceed to submit the issue with sufficient evidence that the student has cheated.

Pair Programming

Programming projects can be performed in teams of two members. The goal is to learn pair programming principles and extreme programming techniques that are used in industry. This allows the students to learn from each other and learn to collaborate. The main responsibilities for such collaboration are:

1. All the members of the team need to have project ownership, i.e., participate equally in the design, development and documentation. The instructor will ask in depth questions to all members of the team.
2. **All programming must be done in the pair.** Do not continue programming outside the pair. If you can't finish in one session, meet again. If that's impossible, save a copy of the code you pair-programmed for separate submission. Then work alone to finish the code. Review the part you coded alone with the other team members.
3. You need to follow the rules of pair programming, switching roles from observer to driver every 15 minutes or so.
4. All members receive the same grade.
5. A team leader will make the assignment submission. This is just to maintain one submission per team and in no way the team leader should do less or more work than the rest of the team members.
6. Students need to bring up collaboration issues early (first week of assignment) in order to switch teams.

Accommodations for Adults with Disabilities

The College will make reasonable accommodations for persons with documented disabilities. Students should apply for services at the Center for Disability Services/SNAP located on the first floor of the Lightsey Center, Suite 104. Students approved for accommodations are responsible for notifying me as soon as possible and for contacting me **one week before accommodation is needed.**

Final Notes

- I have a Greek accent that may be hard to understand sometimes. Please do not hesitate to ask me to repeat something.
- If you need to record the class, you may do this with your phone provided that you do not disturb the class.
- Please respect your classmates. Put your phone in silent mode before the lecture starts.