

SYLLABUS

CSCI 2270: COMPUTER SCIENCE 2: DATA STRUCTURES

FALL 2017, 4 CREDITS

Class meeting times: Lecture

Section 100: Monday, Wednesday, Friday 1:00-1:50pm FLMG 155

Section 200: Monday, Wednesday, Friday 3:00-3:50pm MUEN E050

Recitations vary

Website: <https://sites.google.com/a/colorado.edu/csci-2270>

You must log in to  with your Colorado.edu account to use the website!

INSTRUCTOR INFORMATION

Name: Elle Boese

Email: Elizabeth.boese@colorado.edu

Office Location: ECOT 733

Office Hours: see course website "Help" tab

COURSE INFORMATION

Fit within curriculum: second required foundation course for Computer Science BS and BA students.

Course description and prerequisites: Studies data abstractions (e.g., stacks, queues, lists, trees) and their representation techniques (e.g., linking, arrays). Introduces concepts used in algorithm design and analysis including criteria for selecting data structures to fit their applications. Requisites: Requires prerequisite courses of CSCI 1300 or CSCI 1310 or CSCI 1320 or ECEN 1030 or ECEN 1310 and APPM 1345 or APPM 1350 or MATH 1300 or MATH 1310 (all minimum grade C-).

TEXTBOOKS AND MATERIALS

Required text: Cormen et al.: Introduction to Algorithms, Third edition. 2009. ISBN-13: 978-0262033848

Other supplemental materials: on course website.

ANNOUNCEMENTS

You are responsible for all announcements made online as well as during lectures and recits/labs.

COURSE OUTCOMES

- Document code including pre-condition/post-condition contracts for functions and invariants for classes.
- Determine quadratic, linear and logarithmic running time behavior in simple algorithms, write big-O expressions to describe this behavior, and state the running time behaviors for all basic operations on the data structures presented in the course.
- Create and recognize appropriate test data for simple problems, including testing boundary conditions and creating/running test cases, and writing simple interactive test programs to test any newly implemented class.
- Define basic data types (vector, stack, queue, priority queue, map, list).
- Specify, design and test new classes using the principle of information hiding for the following data structures: array-based collections (including dynamic arrays), list-based collections (singly-linked lists, doubly-linked lists, circular-linked lists), stacks, queues, priority queues, binary search trees, heaps, hash tables, graphs (e.g. for depth-first and breadth-first search), and at least one balanced search tree.
- Be able to describe how basic data types are stored in memory (sequential or distributed), predict what may happen when they exceed those bounds.
- Correctly use and manipulate pointer variables to change variables and build dynamic data structures.
- Determine an appropriate data structure for given problems.
- Follow, explain, trace, and be able to implement standard computer science algorithms using standard data types, such as a stack-based evaluation of arithmetic expressions or a traversal of a graph.
- Recognize situations in which a subtask is nothing more than a simpler version of the larger problem and design recursive solutions for these problems.
- Follow, explain, trace, and be able to implement binary search and a variety of quadratic sorting algorithms including mergesort, quicksort and heapsort.

Brief list of topics to be covered:

- Cost of algorithms and Big O notation.
- Memory and pointers, structs, and dynamic memory allocation.
- Linked lists, stacks and queues.
- Trees: Binary trees, binary search trees, tree traversal, recursion.
- Tree balancing.
- Graphs: graph traversal algorithms, depth-first and breadth-first search.
- Hash tables, hash functions, collision resolution algorithms

- Algorithms for sorting, such as insertion sort, bubble sort, quick sort, and merge sort.

ASSIGNMENTS

All homeworks/assignments and recitation lab exercises list the objectives for that assignment/exercise. The objectives list the topics that you are to learn and practice with for that assignment/exercise. Therefore, if you do not use the data types/structures/etc. listed in the objectives, you may not receive credit for the assignment. Do not use stuff we have not covered yet – the point of the assignment/exercise is to ensure that you understand the listed objectives. You will have time to work with other things in later assignments/exercises/courses.

GRADING

Grading Policy:

| | |
|-----|-----------------------|
| 40% | Assignments/Homeworks |
| 10% | Recitations |
| 50% | Quizzes |

ONLINE COURSE MANAGEMENT

This course will use the Computer Science Moodle (<http://moodle.cs.colorado.edu>) for assignment submission, quizzes, exams, etc. Moodle requires you to log in with your university email account.

This course will use Google sites (<https://sites.google.com/a/colorado.edu/csci-2270>) for some of the course management including announcements, tentative schedule, grades, etc. This site requires you to be logged in to Google with your identikey Colorado.edu account (e.g., elbo5410@colorado.edu). *Hint: Best option if you have a personal gmail account is to open either a different browser for this course, or open a window incognito to ensure you stay logged in to Google with your Colorado account.*

VIRTUAL MACHINE (VM)

All of the course's programming languages are set up properly on the Computer Science Department's Virtual Machine (VM). This is recommended to allow you to focus only on the content of the course, rather than setting up your own development environments. To download and set up the VM, go to the website (<https://foundation.cs.colorado.edu/sde>) and follow the instructions. Help with this process will also be available during recitation.

DROPBOX

Your work (in this course and others) is very important, and we recommend that you store your files on Dropbox. Visit the website (dropbox.com) and create an account.

EMAIL

You can email the course instructors and graders privately by sending an email from your Colorado.edu account to csci-2270-email@googlegroups.com

All email correspondence with respect to this course must be done using colorado.edu email addresses. We are unable to respond to emails from other domains due to FERPA.

Emailed questions will be responded to within 48 business hours (excludes weekends and holidays). Please make use of the online discussion forum for more timely responses from your peers.

If you have more general questions about the course, course materials, homeworks, etc. then please use the discussion board. You will get a more timely response by other students, and this will answer the question for others who also have the same question.

SUBMISSION POLICY

Recitations/labs are due by the date shown on the schedule calendar on the website. You must show a TA your work for credit (do not email it unless you have special permission from the instructor).

Other submissions (homeworks/assignments, quizzes) are due when specified and must be submitted online in Moodle (not through email).

There is no late period for labs, assignments/homeworks, exams/quizzes.

Only submissions correctly submitted online in Moodle will be accepted (we do not accept files via email). This includes late submissions as well.

You can verify that your submission is uploaded correctly in the online submission system – **it is your responsibility to ensure that you submitted the correct solutions and submitted them correctly during the time allocated.** After you submit online, go back to the assignment submission page, ensure it shows that you have submitted, then download your submission, and run it to make sure it is the correct and everything is right.

In the case of documented personal, family, or medical emergency please let the instructor know as soon as possible.

Your lowest lab grade will be dropped at the end of the semester.

There will be an optional extra assignment at the end of the semester that you can complete (requires a grading interview) to replace your lowest homework assignment grade.

You can take the quizzes as many times as you want up until the due date. Your highest score will be your final score. There will be an optional extra quiz at the end of the semester that you can take to replace your lowest quiz score.

If you miss a homework/assignment or do poorly on one, you have the opportunity to complete a one-on-one interview grading meeting with a TA for up to half of the points lost on the assignment (if you did not submit anything, you can get up to 50%; if you lost 10% on the assignment, you can get up to 5% back).

Signing up for grading interviews is to be done on Moodle by the sign-up due date.

Interview Grading process

- Between 15 - 30 minutes with the TA or instructor
- You will be asked questions about your project or about certain topics. There *may* be a written component as well.
- Usually there is an opportunity for you to ask questions as well

Sign-ups

- You are required to have signed up online for an interview grading time slot by a certain date (or notify the instructor that none of the times work so we can adjust the day/time slots to work for everyone).
- Once the sign-up date has passed, if you have not signed up for a time slot then you will need to pick from the remaining time slots available, if any.
- No new time slots will be added once the sign-up due date has expired.

Missing/Cancelling in-person grading interviews

- If you are 3-6 minutes late you will receive a -20% penalty (don't be late).
- If you are later than 6 minutes or miss your time altogether, you will receive the grade you earned in Moodle.
- If you miss your meeting or cancel the grading interview within 24 hours of your time slot, you will receive the grade you earned in Moodle.
- If you fail to sign up for a grading interview, you receive the grade you earned in Moodle. For the optional extra credit at the end of the semester, you must attend a grading interview otherwise you get no points for the extra credit.

If you have a legit reason for missing your slot (planned issue), contact the instructor and TA before your time slot.

ATTENDANCE POLICY

Attendance at all class meetings is required. You are responsible for all announcements and material presented during class time.

Attendance at recitations/labs is required. If you know you will be missing a weekly recitation/lab, go to a recitation/lab (preferably with the same TA) being held at a different time.

You are responsible for knowing the material presented during class and recitation, even if you were not in attendance when the material was presented.

ACCOMMODATION STATEMENT

I am committed to providing everyone the support and services needed to participate in this course. If you qualify for accommodations because of a disability, please submit to your professor a letter from Disability Services in a timely manner (for exam accommodations provide your letter at least one week prior to the exam) so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities. Contact Disability Services at 303-492-8671 or by e-mail at dsinfo@colorado.edu. If you have a temporary medical condition or injury, see Temporary Medical Conditions: Injuries, Surgeries, and Illnesses guidelines under Quick Links at Disability Services website and discuss your needs with me.

RELIGIOUS OBSERVANCES

[Campus policy regarding religious observances](#) requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required assignments/attendance. If this applies to you, please speak with me directly as soon as possible at the beginning of the term.

CLASSROOM BEHAVIOR

Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, color, culture, religion, creed, politics, veteran's status, sexual orientation, gender, gender identity and gender expression, age, ability, and nationality. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. For more information, see the policies on [class behavior](#) and [the student code](#).

OUT OF CLASS EXPECTATIONS

Though many of the above stated policies address academic climate within the classroom, these policies should also be upheld outside of the classroom. As a member of the CU community you are expected to consistently demonstrate integrity and honor through your everyday actions. Faculty, TAs, and staff members are very willing to assist with your academic and personal needs. However, multiple professional obligations make it necessary for us to schedule our availability.

Suggestions specific to interactions with faculty and staff include:

- Respect posted office hours. Plan your weekly schedule to align with scheduled office hours.
- Respect faculty and staff policies regarding use of email and note that staff and faculty are not expected to respond to email outside of business hours.

Send email messages to faculty and staff using a professional format. Tips for a professional email include:

- Always fill in the subject line with CSCI-2270 and a topic that indicates the reason for your email to your reader.
- Respectfully address the individual to whom you are sending the email (e.g., Dear Professor Smith).
- Avoid email or text message abbreviations.
- Be brief and polite.
- Add a signature block with appropriate contact information.
- Reply to email messages with the previously sent message. This will allow your reader to quickly recall the questions and previous conversation.
- All email must be from a Colorado.edu account for FERPA regulations.

DISCRIMINATION AND HARASSMENT

The University of Colorado Boulder (CU-Boulder) is committed to maintaining a positive learning, working, and living environment. CU-Boulder will not tolerate acts of discrimination or harassment based upon Protected Classes or related retaliation against or by any employee or student. For purposes of this CU-Boulder policy, "Protected Classes" refers to race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. Individuals who believe they have been discriminated against should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Student Conduct (OSC) at 303-492-5550. The [full policy on discrimination and harassment](#) has more information.

HONOR CODE

All students of the University of Colorado at Boulder are responsible for knowing and adhering to [the academic integrity policy](#) of this institution. Violations of this policy may include: cheating, plagiarism, aid

of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-735-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). The [Honor Code Office](#) has more information.

Collaboration on the homework assignments is allowed and *encouraged*. Students are most successful when they are working with other students to understand the concepts. The ultimate goal is that you fully understand the code you develop.

Your collaborators may be asked to evaluate your contribution. You must acknowledge your collaborators in your comments.

Plagiarism includes using material from outside sources (e.g., the web, other people) without clear identification and citation. Unless otherwise specified, you *may* make use of outside resources (internet, other books, people), but then you must give credit by citing your sources in the comments inside your code.

Examples:

```
// Modified version from https://github.com/Phhere/MOSS-PHP
// Adapted from Program #7.2 in book "Accelerated C++" by Stroustrup
// Worked with Joe Smith from class to come up with algorithm for sorting
// Received suggestions from stackExchange website (see http://....)
```

"A good rule of thumb: if it did not come from your brain, then you need to attribute where you got it."

Note: you do not need to cite if you are adapting from slides for the course or the required textbook for the course or from the hired staff for the course.

Certain homeworks, quizzes, or exams may be required to be done without outside resources (see course for details). In these cases you should not make use of any resources outside of the ones specified. Use of outside resources in these cases would violate the academic integrity policy.

Violations of the Policy

Some examples of violating the academic integrity policy include (but not limited to):

- Sharing a file with someone else.
- Copying or using outside resources and not citing your sources.
- Stealing a copy of someone else's work and submitting as your own (even with modification).

Examples of collaborating correctly:

- Asking another student for a helpful suggestion.
- Reviewing another student's code for issues/bugs/errors.
- Working together on the whiteboard (or paper) to figure out how to approach and solve the problem.

One way to know you are probably collaborating well is if everyone fully understands the code that is developed. If you do not understand what is in your code or why certain parts of the code are in there, you need to ask someone to clarify!

Any discovered incidents of academic dishonesty will lead to an automatic academic sanction in the course and a report to both the College of Engineering and Applied Science and the Honor Code Council. Students who are found to be in violation of the academic integrity policy can be subject to non-academic sanctions as well, including but not limited to university probation, suspension, or expulsion.

Academic honesty boundaries are hard to define crisply, and they differ from class to class. If you are in any doubt about where they lie for this class, please ask the instruction staff.