

CS 20A: Data structures with C++

Instructor: Serghei Mangul, PhD

Session: Wednesdays from 6:45 – 9:50 PM in Business 255

Final Exam: held from **6:45 – 9:50** PM on December 12 in Business 255

Office Hours: Wednesdays from 6:20 PM to 6:45 PM and 9:50PM -10:15PM

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Course Description:

This course is an introduction to the study of computer algorithms and data structures. This advanced programming course will use the C++ language to teach methods of representing and manipulating data within a computer. Topics include stacks, queues, trees, sorting, searching, modeling, and dynamically created storage spaces. Students will learn the problem-solving skills necessary to write and read complex computer programs and to make important design decisions.

Text:

In response to student feedback, this semester we will be using **free** ebooks.

- “Open Data Structures (in C++)”, by Pat Morin. The ebook is available at <https://lecture.ecc.u-tokyo.ac.jp/~ktanaka/mis2-2016/ods-cpp-mis2.pdf>
- “Data Structures and Algorithm Analysis” Edition 3.2 (C++ Version) Clifford A. Shaffer. The ebook is available at <https://people.cs.vt.edu/shaffer/Book/C++3elatest.pdf>

Software:

The course will use Microsoft’s Visual Studio development environment. All are installed on the hard drives of the lab computers. Copying of commercial software is not allowed and is an infringement of applicable copyright law. Students wishing to use Linux (g++) are encouraged to do so.

Coursework:

In addition to reading assignments and in-class work, homework will be assigned. You are expected to have the reading assignments completed before the class session of each week. Homework is to be submitted at the start of class on the due date. LATE HOMEWORK WILL NOT ACCEPTED.

Electronic Submission:

We will be using Github system to submit programming projects. All students enrolled in this class are required to open GitHub account (<https://github.com/>) and join GitHub Classroom based on the invitation. Instructions on how to submit programming will be posted in GitHub Classroom.

<https://github.com/data-structures-c>

Course Website:

All students enrolled in this class have been provided access to a course website. You will find electronic copies of all the information presented and demonstrated in class available for downloading there. While the class has yet to get going, I highly recommend you familiarize yourself with the site and the way I am posting content for your use.

The course website is available from <http://www.smcclasses.net>. Your username is the first letter of your first name followed by the first letter of your last name and then the last four digits of your student ID. Your initial password is same as your username. You will be forced to change your password and provide your email address when you first log into the system. As an example if my student ID were 000000, my username would be: hs0000 Once your profile is established, you can update and change your email address as frequently as you like.

Evaluation and Grading:

- **Assignments:** During the semester, a number of assignments will need to be completed. There will be a total of 8 assignments. These Assignments need to be turned in on the date scheduled. No credit for late assignments. The lowest of your scores will be dropped and not count toward your final grade. Since one of your scores will be dropped, late assignments will not be accepted. YOU WILL BE DROPPED FROM THE CLASS IF YOU FAIL TO TURN IN THREE ASSIGNMENTS.

- **Project.** During the semester, a number of programming projects will need to be completed. There will be a total of 6 programming projects. These Programming Projects need to be turned in on the date scheduled. The lowest of your project scores will be dropped and not count toward your final grade. Since one of your scores will be dropped, late projects will not be accepted. **YOU WILL BE DROPPED FROM THE CLASS IF YOU FAIL TO TURN IN THREE PROGRAMMING PROJECTS.**
- **Quizzes:** There will be two quizzes covering textbook reading assignments and class activities. Each quiz is worth 40 points, but only one quiz will be considered in your grade. Since you will be able to drop your lowest score, there will be no make-up quizzes. Each quiz will only cover a small section of the class. **YOU WILL BE DROPPED FROM THE CLASS IF YOU FAIL TO TAKE TWO QUIZZES.**
- **Midterm:** A midterm will be given during week 7 of the semester.
- **Final Exam:** A comprehensive final exam will be given at the end of the semester. It will cover most topics covered during the course.

Assessment: Category

Category	Point Value	Total	Percent
Assignments (8)	10	70	17.5%
Programming Projects (6)	20	100	25.0%
Quizzes (2)	40	40	10.0%
Midterm (1)	70	70	17.5%
Final Exam (1)	120	120	30.0%

Grading Scale
400-360 A
359-320 B
319-280 C
279-240 D
0-239 F

Late Policy

All assignments are due on the scheduled dates. Late work is highly discouraged because you need to keep up with the class to succeed. No late assignments will be accepted.

Attendance

Attendance in class is expected and necessary for maximum credit. Any student who misses two consecutive classes without having made prior arrangements with the instructor will be dropped from the course.

Honor Code and Code Of Student Conduct

As a testament to their commitment and readiness to join the Santa Monica College academic community, all students are expected to uphold the Honor Code. At the time of admission, students will certify the following statement:

In the pursuit of the high ideals and rigorous standards of academic life, I commit myself to respect and uphold the Santa Monica College Honor Code, Code of Academic Conduct, and Student Conduct Code. I will conduct myself honorably as a responsible member of the SMC community in all endeavors I pursue.

Honest and ethical students are protected in this class. The SMC Honor Code and Code of Academic Integrity, printed in the General Catalog, remind students of their responsibility to behave honestly and ethically. It is your responsibility to familiarize yourself with these codes. Please be extremely careful that you do not engage in any behavior that could even be construed as cheating. Outside of class, students are allowed to study together. However, copying another student's homework is not acceptable. If I determine that students have relied too heavily on each other in preparing homework or any other project, the students may be assigned no credit. Future occurrences could result in academic disciplinary action.

Cheating

All work you submit must be your own individual work. If you copy another person's work or let another person copy your work, you are cheating. Cases, where submitted work looks alike, will result in an "F" on the project and will be subject to the student discipline process. The College's Code of Academic Conduct applies to each and every course as well as each and every member of the academic community, faculty and students alike. IN ORDER TO JOIN THIS SECTION, ALL STUDENTS ARE REQUIRED TO SIGN THE CS20 SURVEY STATING THAT THEY ARE AWARE OF AND WILL FOLLOW THE ACADEMIC HONESTY POLICY.

Students with Special Needs

In compliance with the Americans with Disabilities Act (ADA), all qualified students enrolled in this course are entitled to “reasonable accommodations”. Any student who needs special attention should speak privately with the instructor to describe their needs. This should be done within the first two weeks of the start of class.

Children In Class Policy

Only in extreme cases are children allowed in the classroom or laboratory facilities, and then only with the approval of the instructor prior to the start of class.

Electronic Devices In Class Policy

Cellular phones, pagers, CD players, radios and similar devices are prohibited from the classroom and laboratory facilities. Calculators and computers may not be brought into examinations and quizzes unless specified. Reasonable laptop-size computers may be used in lecture for the purpose of taking notes.

Incomplete Policy

Students will not be given an incomplete grade in the course without sound reason and documented evidence. In any case, for a student to receive an incomplete, he or she must be passing and have completed a significant portion of the course. Make sure you are aware of the college drop policy. In case of absence, it is your responsibility to find out what material was covered and what assignments were given. IT IS YOUR RESPONSIBILITY TO DROP/WITHDRAW FROM CLASS BY THE PUBLISHED DEADLINES OR YOU WILL RECEIVE A GRADE.

Tentative Class Schedule

Below is a tentative schedule and is subject to change. Lectures and reading assignment will cover the materials from the required text and handouts. It is important to attend class since changes may be made to the schedule published below.

Date	Topics
Week 1 August 29	Lecture: Introduction Lecture: C++ Basics Homework: review your C++
Week 2 September 5	Lecture: Inheritance, Virtual Functions, Recursion, Templates
September 9	<i>Last Day To Withdraw To Avoid W On Permanent Transcript</i>
Week 3 September 12	Lecture: Analysis Of Algorithms and Math Review
Week 4 September 19	Lecture: Analysis Of Algorithms and Math Review Turn In: Assignment #1 and Programming Project #1 Quiz 1
Week 5 September 26	Lecture: Lists, Stacks and Queues Turn In: Assignment #2
Week 6 October 3	Lecture: Introducing Trees, Binary Trees Turn In: Programming Project #2
Week 7 October 10	Lecture: Binary Search Trees, AVL Trees and Red-Black Trees Turn In: Assignment #3
Week 8 October 17	Midterm Turn In: Assignment #4
Week 9 October 24	Lecture: Compression, Huffman Coding and XML Turn In: Programming Project #3
Week 10 October 31	Lecture: Heaps and Priority Queues Turn In: Assignment #5
Week 11 November 7	Lecture: Sorting Turn In: Programming Project #4
Week 12 November 14	Lecture: Hashing Turn In: Assignment #6
November 18	<i>Last Day To Withdraw From Class</i>
Week 13	Quiz 2

November 21	Turn In: Assignment #7
Week 14 November 28	Lecture: Graphs and Automata and Final Exam Review Turn In: Programming Project #5
Week 15 December 5	Lecture: Final Exam Review Turn In: Assignment #8
Week 16 December 12	FINAL EXAM HELD DURING CLASS PERIOD Turn In: Programming Project #6