CS 16 – Problem Solving with Computers I

Syllabus – Fall 2020

Class Time:	**Live Zoom class every Tue. 11 AM – 12:30 PM**, Pre-recorded lectures on Thu.		
	ALL ZOOM CALL-IN INFORMATION IS ON OUR GAUCHOSPACE WEBSITE		
Instructor:	**Dr. Ziad Matni**	**Email:**	ziad.matni@ucsb.edu
Office Hours:	Wednesdays 3:00 PM – 4:30 PM on **Zoom**		
Lab Sections:	Online Tuesdays 1, 2, 3, 4 PM (4 SECTIONS), Connect via **Zoom**		

TA Info. & Office Hours:	Jingxuan Cao	jingxuan@ucsb.edu	Thu. 9:00 AM – 11:00 AM
	Subramaniyam "Subra" Shankar	subramaniyam@ucsb.edu	Mon. 11:00 AM – 1:00 PM
	Abtin Bateni	abtinbateni@ucsb.edu	Mon. 9:00 AM – 11:00 AM
	Xinlu Zhang	xinluzhang@ucsb.edu	Thu. 3:00 PM – 5:00 PM
	Regina Weinreb (ULA)	rweinreb@ucsb.edu	Thu. 11:00 AM – 1:00 PM
	Zechen Ma (ULA)	zechenma@ucsb.edu	Thu. 1:00 PM – 3:00 PM
	Tommy Chao (ULA)	tchao@ucsb.edu	Thu. 3:00 PM – 5:00 PM

All TA office hours will take place on Zoom – see GauchoSpace for call/URL details

Class Main Website:	**GauchoSpace**	**https://gauchospace.ucsb.edu/**
Class Assignment Submissions:	**Gradescope**	**https://www.gradescope.com/**
Class Q&A/Discussion Site:	**Piazza**	**https://piazza.com/ucsb/fall2020/cs16**

Catalog Description

https://www.cs.ucsb.edu/education/courses/cmpsc-16

Class, Section and Office Hour Formats

This class will **NOT** meet face-to-face for lecture this quarter and will be conducted **completely online** for the duration of the quarter. Some of the class will be **synchronous** (i.e. "live") and some it will be **asynchronous** (i.e. recorded and other material for you to view).

*Our first meeting will take place on **Zoom** on Thursday, October 1st*
(details will be emailed out beforehand).

We will be meeting on Zoom once a week on ***Tuesdays* at 11:00 AM (PT)** and I will be posting class instructional videos (and other material) on GauchoSpace on ***Thursdays***. You will watch the videos, do the associated readings, and take the associated module timed quizzes every week.

The live Zoom sessions **will be recorded** for students who may not be able to attend and posted on GauchoSpace afterwards. *By default, your microphone and camera will be muted when you join the session. If you do not want to be included in the recording, simply keep your camera and microphone off.* You may ask questions in the chat window. **Please do not share the recording or any class material with non-students** as this is a violation of certain UCSB, state, and federal policies and laws. **The instructor reserves the sole legal right to record and distribute this material**.
You also have:

- Weekly quizzes (instead of midterm exams) every **Friday**
- Weekly homework AND lab assignments to turn in every **Monday**

The purpose of the lectures in this course is to guide you through the readings and assignments. Especially as it pertains to:

- provide an overview of how everything fits together,
- provide hands-on demonstrations of things that you'll do on your own later,
- provide additional information that is not in the textbook/handouts (and to sometimes clarify the textbook/handouts), and
- provide an opportunity to ask questions, and read/hear answers to questions asked by others.

This course moves quickly, so keeping up with the videos and the readings every week is very important and is key to doing well in this class.

Lab sections will **NOT** be conducted in a physical space and will be **completely online** instead via Zoom. Your attendance for lab sections is mandatory and, unlike lectures, lab sections will **NOT** be recorded.

I will put up your homework and lab assignments on our main website and you will turn them in by the posted due date. Lab teaching assistants (TAs) and undergraduate learning assistants (ULAs) will be available for help on homework and lab matters and explaining class concepts during their office hours.

All office hours (prof's, TAs', LAs') will be **on Zoom** and as listed on the 1st page of this syllabus. You are highly encouraged to go to these with your questions. You can also pose questions – and answer each other's questions – on **Piazza**.

Invariably, you are going to have questions on lecture or homework-related stuff. What do you do? **Your first choice should always be to use Piazza to post the question** (or see if anyone's asked it and received an answer). Make it a habit to check Piazza many times a week – see if you can answer your fellow students' questions yourself! The TAs and the instructor will also be using Piazza periodically to help you out. Please don't use Piazza to post outright solutions to homework problems – you can, of course, *discuss* the exercises and ways to solve the problems. **Your next choice** should be office hours for the instructor and the TAs.

I encourage you to contact me with your questions via Piazza. If you have questions that you'd rather email me with, then **PLEASE put "CS16" in the subject line.** Please keep in mind that this is NOT the only class I teach!

Expected Conduct

Although this is an online class, I still expect you to be responsible for your own learning and to ask questions via the channels explained above whenever you have them and to your video viewings and textbook readings as assigned.

I expect you to do your own work at all times. Please familiarize yourselves with the university's policies on academic integrity and honesty (see the section in this syllabus that details this further). Failure to comply with these policies will result in failing the class (i.e. you will get an F on your transcript and you will be reported to the university).

About CMPSC 16

This is an **intermediate** class in computer science that will cover the basic building blocks for solving problems using computers. Specifically, you will learn how to use computational abstractions to solve problems and how to translate these computational abstractions into C++ programs. It's assumed that you've taken both MATH 3A and CS 8/ENG 3 already and that you are familiar enough with introductory topics on computers and programming. By the end of the course, students will be able to:

- **identify** correct C++ syntax and semantics and will be familiar with the common mechanisms of the C++ language
- **apply** Linux tools to create, submit, compile and run C++ programs
- **select** appropriate computational abstractions based on their knowledge of underlying computer systems
- **decompose** complex problems into more manageable parts
- **create** C++ programs that solve application-specific problems

Learning how to program requires time, perseverance, and consistent practice: exactly like practicing a musical instrument, a field sport, or cooking a gourmet meal. There's a *science* behind programming, but it is also about *technique* – and that requires you to "*get your hands dirty*" and practice, practice, and then practice some more! You are bound to make mistakes – and that's ok because you will learn from them. Making mistakes means **you are learning!** Do not be afraid of trying something that you initially have *no clue* about! Remember that practicing early and often will make you a better programmer in the end. This means that you should not procrastinate and wait until the last moment to do your assignments and homework… but you knew that already, didn't you!? ;)

What you need to know BEFORE you take this course

This course will present C++ from the beginning; no prior knowledge of C++ is assumed. However, it IS assumed that you already have successfully completed CMPSC 8, or have an equivalent background in programming (like AP Computer Science). You should be comfortable with all of the following:

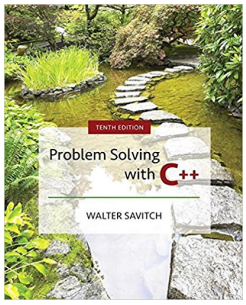
- Problem solving
  - breaking down a problem into a sequence of steps
  - abstracting specific problems into general ones and finding general solutions
- Memory concepts
  - variables, primitive vs. reference variables, name, type, value
  - assignment statements
  - scope of variables
- Control structures
  - for loops, if/else, while loops
- Arrays (or a similar data structure, e.g. Lists in Python)
  - index vs. value, finding sum, min, max, average, count of elements matching some condition, making a new list of elements containing only those that match some condition
- Functions
  - function *call* vs. function *definition*
  - parameters (arguments)
- How to test your code
- Input/output concepts

  - Writing to the terminal
  - Reading from the keyboard
  - Reading and writing to files
  - Neatly formatting output
- Program style (i.e. how to write code that other people can read and understand)

What you will learn by the end of this course to be ready for the next programming class (CS 24)

So, what is it that you need to know by the end of this course? Here's the list of just a few of the things you'll need to know to be ready for CS 24 (the next programming course). You'll have the opportunity to learn all of these things (though not necessarily in this order).

- Basic data types in C++ (int, double, char, bool, string, const)
- The basic control structures in C++ (if/else, while, for etc.)
- Defining functions in C++, and passing parameters to functions in different ways
- The basic principles of recursion, and some idea of when a recursive solution is appropriate.
- Scope and lifetime of variables in C++
- Using arrays in C++, and C-strings (null-terminated character arrays)
- Using arrays in functions in C++
- Defining and working with structures (*struct*) and classes in C++
- The difference between the stack and the heap
- Converting from binary to decimal, octal, and hex, and back again—and how this relates to how C++ programs store various kinds of data in memory.



Required Textbook

Problem Solving with C++ (10th Edition)
by Walter Savitch

ISBN-13: 978-0134448282
ISBN-10: 0134448286

(9th edition is ok to use, but references may be different)

Class Format

Keeping up with your lectures and your labs is mandatory to do well in this class.

This course has **multiple readings**, **9-10 homework assignments**, **8-9 lab assignments**, **8-9 quizzes** and **one final exam**. You will take your quizzes, submit homework, and your lab assignments all **online via Gradescope**. It is really important to do the class readings ahead of time. Class participation is highly encouraged (and recognized by me too!)

Just as in a math class, everything we do in this class (and almost all classes in CS) builds on all the work that came before. So, ***everything is cumulative***—meaning that you can't afford to miss any classes unless absolutely necessary. Miss two lectures in a 10-week two-lecture per week course, and you've already skipped 10% of the course—it wouldn't be surprising if your performance (i.e. final grade) in the course dipped by a similar amount!

You may find the workload heavy. It may even feel unreasonable compared to your other courses. *However, I assure you that it is not unreasonable, given the goal of making you a skilled beginning programmer*. Programming is a skill, and the only way to get good at it is lots and lots of practice, which takes lots and lots of time. The usual "folklore" rule of thumb is 8–12 hours per week for a normal college class. That means you should expect, at a minimum to put in 5–9 hours per week on this course, on top of the time you spend in lecture and lab each week.

Homework and Lab Assignments

Every week, you'll be given 1 homework assignment AND 1 lab assignment.

You will do these and submit them electronically on **Gradescope** (PDFs for homework and C++ programs for the lab). *You can only turn in your assignments on Gradescope, so emailing them will not be accepted nor graded*. Be familiar with my late policy (see below) – it applies to all submitted assignments in this class.

You can *work* with a "homework-buddy" on your homework assignments, **but you each have to turn in your own work *and* you have to disclose who you worked with** (there's a place to do that on the homework form). Please be very aware of the University's policy on academic dishonesty.

Again, please do **NOT**:

- Have someone else do your homework for you (that will be considered academic dishonesty).
- Copy answers directly from other students or (heaven forbid!) a website. Do your own work!
- Forget to cite (i.e. give credit to) your sources, if you consult your textbook, a website, or person.
- Submit homework in any other way than through Gradescope.
- Switch from your registered lab section without prior approval from the professor and the TAs.

Quizzes and Exams

You will a **weekly** quiz in this class in place of midterm exams, so that's a total of 8 or 9 quizzes.
The quizzes will be done online via **Gradescope**. Quizzes will be open for a 24 hour period, but once you start taking a quiz, you will have a certain number of minutes to complete it (the amount of minutes you have will vary by quiz, but they are intended to be short-to-medium length).

There is a final exam for this class and it is cumulative.
If you miss the final exam, you will get an F in the class.

Late Submission Policy

Late submission means missing the given deadline of the assignment (any assignment – homework, or lab). I will give a GRACE PERIOD of **24 hours after deadline**, when your submitted assignment will get a 20% point penalty (example, if your work is scored at 88%, the penalty would bring it down to 68%). Anything submitted beyond 24 hrs will be given a ZERO grade.

The primary purpose of the deadlines is to allow the TAs and the instructor to manage their workloads. Therefore, if you want your work to be graded without penalty, turn it in on time.

Make Up Policy

Generally speaking, I do **not** allow for makeups for any type of assignment, quiz, or exam in this class, with very few exceptions, like a **documented** family emergency, extended illness, required court appearance, or other situation beyond the students' control (again, **with documentation**). I *may* grant additional make up days entirely at my discretion—but this is **not** a guarantee or a right. Asking for accommodation because "I already bought my plane ticket" or "I have out of town guests that week" will get you nowhere…

Participation and Attendance

I will ask for participation, often in the form of answering poll questions on Zoom in the live lectures. Students are expected to keep up their attendance of live lectures, although I will not actively take attendance in class.

Grading

Item	Grade %	Notes
Homework	20%	Each assignment weighted the same as the others. Unless otherwise told.
Labs	30%	Each assignment weighted the same as the others. Unless otherwise told.
Quizzes	25%	Each quiz is weighted the same as the others. Unless otherwise told.
Final	25%	Cumulative and required.
TOTAL	**100 %**	

Class Grade Distributions

These are calculated to 2 decimal places and strictly assigned.

Range	Grade
[93 – 100]	A
[90 – 93)	A-
[87 – 90)	B+
[83 – 87)	B
[80 – 83)	B-

Range	Grade
[77 – 80)	C+
[73 – 77)	C
[70 – 73)	C-
[60 – 70)	D
< 60	F

[X – Y) means ***"X to Y inclusive of X (but not Y)"***

A+ grades: These may be awarded to the *very* best performing students in the class—but the cutoff for A+ grades will be determined at the end of the course at the discretion of the instructor (there is no pre-determined cutoff---an average of 97 or more doesn't guarantee you an A+ grade.)

Curves: I usually do not curve grades, but ***IF*** I do, it's (a) to the benefit of all the students and, (b) it's only applied to the final class grade and not on individual exams or assignments.

Please do not grade-grub! I do not round up final grades.

UCSB and Instructor's Policies on Academic Integrity and Honesty

Academic Integrity

It is expected that students attending the University of California understand and subscribe to the ideal of academic integrity, and are willing to bear individual responsibility for their work. Any work (written or otherwise) submitted to fulfill an academic requirement must represent a student's original work. **Any act of academic dishonesty, such as cheating or plagiarism, will subject a person to University disciplinary action**. Using or attempting to use materials, information, study aids, or commercial "research" services not authorized by the instructor of the course constitutes cheating. Representing the words, ideas, or concepts of another person without appropriate attribution is plagiarism. Whenever another person's written work is utilized, whether it be a single phrase or longer, quotation marks must be used and sources cited. Paraphrasing another's work, i.e., borrowing the ideas or concepts and putting them into one's "own" words, must also be acknowledged.

I will report the violation to the Associate Dean of Students for possible referral to the Conduct Committee. That committee has the authority to impose a range of sanctions, including suspension. **Further information is available at: http://judicialaffairs.sa.ucsb.edu/academic-integrity**

Cheating on exams

I make available to *all* students the legitimate practice questions for my exams. I have never released an exam from a previous quarter. Thus, *any* exam from a previous quarter that you get hold of *must have been illegally obtained*. If you come across a previous quarter's midterm or final, you are under the obligation of the university's "code of conduct" to surrender it (and all copies of it) to me. If, however, you choose to study from a previous quarter's midterm or final, no matter how that exam came into your possession, be aware that ***you are cheating***, and if found out will receive a ***zero***. Furthermore, if I discover that a particular organization (e.g., sorority, fraternity, or other club) provides to students or maintains an archive of any of my previous exams, I will file a code of conduct complaint with the University against the organization.

During the exam, you may not look at another student's test or answers, share your answers/test with another student, nor remove a test from the exam room. All of these behaviors are forms of **cheating** and will result in a **zero** on the exam, at minimum.

Inappropriate Use of Course Materials

My lectures and course materials, including PowerPoint presentations, tests, outlines, and similar materials, are protected by U.S. copyright law and by University policy. I am the exclusive owner of the copyright in those materials I create. You may take notes and make copies of course materials for your own use. You may also share those materials with another student who is enrolled in or auditing this course.

You may not reproduce, distribute or display (post/upload) lecture notes or recordings or course materials in any other way — whether or not a fee is charged — without my express prior written consent. You also may not allow others to do so. If you do so, you may be subject to student conduct proceedings under the **UC Santa Barbara Student Code of Conduct**. Similarly, you own the copyright in your original papers and exam essays. If I am interested in posting your answers or papers on the course web site, I will ask for your written permission.

Class Schedule

The lecture topics are subject to change or re-arrangement.

Week	Topic(s)	Assignments and Quizzes
0	Introduction to the class	-
1	Introduction to C++ Variable types, Boolean expressions	HW1, Lab 1, Quiz 1
2	Basic C++ Programs If/else, loops, functions	HW2, Lab 2, Quiz 2
3	Pass by value/reference, Command Line Arguments Arrays (all dimensions)	HW3, Lab 3, Quiz 3
4	TDD (Test Driven Development), debug techniques C++ build process, make files, and git	HW4, Lab 4, Quiz 4
5	Strings and Characters Sorting Data Algorithms	HW5, Lab 5, Quiz 5
6	File I/O Number Systems (Binary/Hex/Octal)	HW6, Lab 6, Quiz 6
7	More Sorting, Searching Data Algorithms Data Structs, Stacks/Queues	HW7, Lab 7, Quiz 7
8	**Thanksgiving Break – no classes**	-
9	Structs and Classes in C++	HW8, Lab 8, Quiz 8
10	Recursion	*TBD*
FINAL EXAM: Wed., December 16th		

Notes about due dates of everything:

- Homework assignments are due on **Mondays** (by 11:59 pm) on Gradescope. Unless told otherwise.
- Lab assignments are due on **Mondays** (by 11:59 pm) on Gradescope. Unless told otherwise.
- Quizzes must be taken in a 24-hour window starting at **Friday** at 9 am on Gradescope. Quizzes ARE timed.

This syllabus and schedule are subject to some change. The professor will do his best to convey changes in a timely fashion to the students, if they occur. Students are encouraged to check the syllabus often via the class' main website. One way to tell if you have the latest version is to check the version number that's at the bottom of each page of this syllabus (e.g. v1, etc…)

Your Weekly Check List:

MONDAYS

- ☐ *Optional*: Attend TAs' office hours
- ☐ Turn in CURRENT **homework assignment** on **Gradescope**.
- ☐ Turn in CURRENT **lab assignment** on **Gradescope**.
- ☐ Look for NEW **lab assignment** on **GauchoSpace**.

TUESDAYS

- ☐ Attend **live lecture** on **Tue. at 11 AM on Zoom**.
- ☐ Attend **live labs on Zoom** during your registered lab time.
- ☐ Look for NEW **homework assignment** on **GauchoSpace**.

THURSDAYS

- ☐ *Optional*: Attend Dr. Matni's office hours
- ☐ *Optional*: Attend TAs' office hours
- ☐ *Optional*: Attend Peer Mentoring Session (with the ULAs)
- ☐ View NEW **pre-recorded lectures** on **Thursday on GauchoSpace**.

FRIDAYS

- ☐ Take NEW **quiz** on Fri. on **Gradescope** – you have a 24-hour window.

Additional Campus Resources

If you experience difficulty in this course for any reason, please don't hesitate to contact your instructor. The following campus services might also be beneficial to you. Please use them as needed.

SOME OF THE FOLLOWING RESOURCES MAY BE LIMITED OR MODIFIED BECAUSE OF THE UNIQUE CIRCUMSTANCES OF THIS QUARTER.

Library Remote Resources
https://www.library.ucsb.edu/news/remote-resources-services-ucsb-library-users
Information on searching and accessing the Library's remotely accessible resources and services is available at the link above.

Disabled Students Program
Location: 2120 Student Resources Building | 805.893.2668 | http://dsp.sa.ucsb.edu/
The Disabled Students Program offers many services, such as reading services, notetaking assistance, test-taking accommodations, and registration assistance. For more information on these services, eligibility, and registration, please call or visit the Disabled Students Program office.

CSO Safety Escorts
805.893.2000 | https://www.police.ucsb.edu/cso/safety-escorts
The CSO (Community Service Organization) Escort Program is a free service provided to all students, faculty and community members during the evening and early morning hours. The objective of the escort service is to provide a safer mode of transportation through campus and Isla Vista. The escort service is based on the "buddy" system which is to simply provide another person to travel with you to your destination. The CSO Escort Service can be used by simply calling the Police Dispatch through the Escort Phone Line at 893-2000. Escorts can also be requested through the Red Emergency Phones located all over campus.

Food For All
If you are facing any challenges securing food or housing, and believe this may affect your performance in the class, you are urged to meet with a Food Security and Calfresh Advocate, who is aware of the broad variety of resources that UCSB has to offer (see their drop-in hours at food.ucsb.edu). You are also urged to contact the professor or teaching assistant if you are comfortable doing so. Please visit food.ucsb.edu for additional resources including Calfresh, the AS Food Bank, and more.

Campus Learning Assistance Service
Location: Student Resource Building 3210 | 805.893.3269 | http://clas.sa.ucsb.edu/
CLAS helps students increase their mastery of course material through course-specific tutoring and academic skills development. The tutorial groups and drop-in tutoring schedules are posted on the website. CLAS also provides workshops and counseling in test-taking as well as paper-writing skills.

Counseling Services (CAPS)
Location: Building 599 | 805.893.4411 | http://caps.sa.ucsb.edu/

Counseling Services offers counseling for personal concerns and crisis intervention, stress management, self-help information, and connections to off-campus mental health resources.
There is a Mental Health Peer Services in CAPS that offers drop-in peer counseling, massage & egg chairs, workshops on managing stress (and many other topics), as well as one-on-one sessions with a peer to help students learn coping skills to reduce anxiety (School Anxiety Program).

CARE (Campus Advocacy, Resources & Education)
Location: Student Resource Building, 1st Floor | http://wgse.sa.ucsb.edu/Care/
Provides confidential advocacy and support to anyone impacted by sexual assault, dating/domestic violence and stalking.

Office of Student Life
Location: Student Resource Building 1104 & 2260 | 805.893.4569 | http://osl.sa.ucsb.edu/
The Office of Student Life provides assistance with student emergencies, administrative withdrawals, and other unique academic situations and options.

ONDAS Student Center
Location: Kerr Hall 1150 | 805.893.3457| http://ondas.ucsb.edu/
The OSC offers academic support, mentoring, special programming, and community for all UCSB students, especially first generation students.

Transfer Student Center
Location: UCSB Library, First Floor, Ocean Side | http://www.transfercenter.ucsb.edu/
A space for transfer students to make connections, find academic support, mentoring, and special programs.

Undocumented Student Services
Location: 2210 Student Resource Building | 805.893.5609 http://www.sa.ucsb.edu/DreamScholars/
USS provides general counseling to undocumented and mixed status students. Services include access to student mentors, programs and legal service referrals.

Educational Opportunity Program
Location: Student Resource Building, Room 2210 | 805.893.4758 | http://eop.sa.ucsb.edu/
EOP provides advising, mentoring, and programming for first generation and income eligible students.

Office of International Students & Scholars
Location: Student Resource Building, Room 3130 | 805.893.2929 | http://oiss.sa.ucsb.edu/oiss-home
OISS provides immigration support for the UCSB community, advising for international students, and cultural programming.

Academic Initiatives
Number: 805.893.2720 | http://academics.sa.ucsb.edu/
Student Affairs Academic Initiatives facilitates student academic and leadership opportunities, and community engagement.