

## CSPB 2400 - Park - Computer Systems

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# CSPB 2400 Syllabus

## CSPB 2400 - Park - Computer Systems Course Syllabus

### Instructor Information

- Name: Chanheum Park
- Email: Chanheum.Park@colorado.edu
- Office hours: Monday 10:30 ~ 11:30 AM (M.T.) Thursday 20:00 ~ 21:00 PM (M.T.)

### Exam Dates

- Exam#1 02/07 (Wednesday)
- Exam#2 02/28 (Wednesday)
- Exam#3 04/03 (Wednesday)
- Exam#4 05/06 (Friday)

### Communication Channels

Piazza: for any questions regarding the course (Link available first day of classes)

Zoom: for interview grading meetings and office hours (Link available first day of classes)

Email: Chanheum.Park@colorado.edu (contact me for emergency issues, include "CSPB 2400" in the subject)

### Course information

Covers how programs are represented and executed by modern computers, including low-level machine representations of programs and data, an understanding of how computer components and the memory hierarchy influence performance.

### Learning goals

Learning goals throughout the term:

- Explain and perform common logical operations (and, or, negation, conversion) on binary variables and binary vectors and identify and apply common boolean algebraic laws such as DeMorgan's laws, idempotence, etc
- An ability to translate between integer binary and decimal data, detect and identify the outcome of operations due to limited data representations (e.g. overflow), distinguish between the data representations and ranges for signed and unsigned data types
- Translate IEEE floating-point representation to and from binary and real numbers and identify the limitations of fixed-precision floating-point representation.
- An ability to relate compiler-generated assembly programs to the corresponding higher-level language structures with sufficient ability to enable debugging high-level programs. Given a machine language representation of a program compiled in a higher level language, students should be identified and describe the operation of conditional statements, loops, function calls, switch statements.
- The ability to explain how higher-level language functions are implemented using the stack of an underlying machine, including how local variables are allocated, trace the execution due to recursion and identify and trace the effect of buffer-overflow of the stack.
- An ability to explain how high-level program structures can be restructured to facilitate optimization for pipelined architectures and cache memory hierarchies.
- An ability to explain how computer memory is organized and represented both to the programmer and to the computer architecture by the operating system through the use of virtual memory mapping.

- An understanding of how to use asynchronous signals, concurrent programs, and the programming issues that arise with such programs, such as race conditions.
- Identify and construct processes on a common computer platform, identify and perform basic synchronization between processes and understand the costs and benefits of using processes.
- An ability to explain how global memory, function-local and dynamic memory allocation is performed and the performance benefits of each form of memory allocation.
- An ability to explain how programming errors may affect program correctness, including errors in function calls, memory allocation, integer, and floating-point data representations.
- An ability to measure program performance and use that measured information to determine how to improve program performance.
- An ability to use a machine-level debugger and inspect the memory and register state of programs.

## TEXTBOOKS AND MATERIALS

Computer Systems, A Programmer's Perspective, 3rd Edition by Bryant and O'Halloran.

ISBN-13: 978-0134092669

ISBN-10: 013409266X

[The international edition is acceptable and much cheaper \(\\$30\) \(Amazon link\)](#) - Just be aware that there are mistakes in some practice problem solutions in this book.

Additional readings will be made available through the course website.

## GRADING COMPONENTS

The course has 4 grading components with the following breakdown:

1. Study and reflection questions (weekly quizzes) - 8% of grade
2. Four non-cumulative exams - 8% each, 32% of grade
3. Six programming labs - 10% each, a total of 60% of grade

Lab Assignments: Your primary assignments will be your "Lab Assignments," given every 2-3 weeks, each of which will be followed by a grading meeting to review your solution with the instructor or TA. The labs are the primary learning vehicle for this course. The grade meetings are scheduled on the Moodle site typically just before the assignment is due, and will begin after the due-date of each Lab. Even if you complete your work, you will not receive a grade unless you conduct a grading session.

The grades for each lab will be based 40% upon the Task Success (i.e. "does it work") and 60% upon your explanation of your code/assignment and answering questions about the lab and its concepts. Historically speaking, students that have completed the assignment themselves usually have a little problem passing the Q&A portion of the grade.

Students may work in teams of up to two for the labs only when explicitly stated on select lab assignments, but each student will still be responsible for scheduling their own grading meeting with the TA for each lab. You may help others only to the extent of answering typical questions that arise during compiling, debugging, and executing your lab assignments.

All assignments are due by the deadline stated. Extensions will not be granted except at the instructor's discretion in documented cases of extreme hardship, emergency, etc., unless otherwise noted.

- On the task success 40% portion of the grade, we *strongly encourage you* to submit even partially working code/assignment by the deadline to obtain partial credit on the 40% for task success.
- You must attend your grading meeting to qualify for grading points. If you miss your meeting with the TA (without notifying your TA ahead of time with a suitable reason), this may result in a zero grade for the assignment. The TA is under no obligation to reschedule your appointment if you miss your meeting, so write down your meeting times, and don't forget them! Even if you are unable to submit fully working code/assignment by the deadline, we *strongly encourage you* to keep working at a full solution for the assignment, which should benefit your understanding and ability to answer questions during the Q&A meeting with the TA.

All labs must be written in C and compiled for execution on the class programming environment, unless otherwise noted.

Reading Quizzes: You will be assigned reading questions similar to the practice questions from the text. Most reading quizzes will be automatically graded and are designed to help you reify your knowledge of the material in a particular section of the book. You should also attempt the self-study questions in the book (answers at the end of the section).

Exams: You will have four proctored exams. The first two exams cover single chapters, each of which have significant material. The other two exams will cover multiple related chapters of material (see below).

# Lab Information

- We have six Labs:
  - Data Lab
  - Bomb Lab
  - Attack Lab
  - Performance Lab
  - Shell Lab
  - Garbage Collector Lab
- Every lab is graded 40% code and 60% interview grading.

# Exam Information

- We have four exams:
  - Exam 1: Chapters 1, 2
  - Exam 2: Chapter 3
  - Exam 3: Chapters 4, 5, 6
  - Exam 4: Chapters 7, 8, 9

## GRADING

The final grades for this class follow the standard percentage breakdown for the College of Engineering:

93%-100% A

90%-93% A-

87%-90% B+

83%-87% B

80%-83% B-

77%-80% C+

73%-77% C

70%-73% C-

67%-70% D+

63%-67% D

60%-63% D-

0%-59.9% F

## Extensions and Extra credit activities

I do not offer extensions on due dates but there are a couple of extra credit activities that can compensate for some of your homework grades. Make sure to start working on the homeworks early in the week to avoid any last-minute issues. There are no extensions on quizzes.

## Proctorio and exam requirements

Proctorio and exam requirements are posted in each course at the top of Moodle. Non-compliance with Proctorio, exam or course instructions may result in a voided exam (score = 0) or an honor code violation. Students are required to understand the conditions allowed for each exam. Ask your instructor if you are unsure about the requirements.

## Piazza, ZOOM, and Email expectations:

### What is Piazza?

Like a classroom, it is a place to ask questions, discuss learning strategies, explore related topics, support your classmates, and contribute to the class. Like a classroom blackboard, all students must read and follow the instructor posts for course and content information, and announcements.

## How do we use Piazza?

It is used for participation grading - see your class syllabus for details. It is a place to practice professional collaboration strategies. Instructors may not reply to all inquiries and let other students answer. Many instructors will use Piazza as a reference in the future for a letter of recommendation.

## What Piazza is not?

A 24-hour helpdesk or answer forum. A robot tutor. A personal blog. A place for others to completely debug your code.

Posts and questions about classwork should be content specific and reflect an effort on the student's behalf. Sample questions that are not content specific and hence inappropriate: Please tell me how to do #6 Explain #6 I'm lost on #6, Help!

Sample questions that are content specific: I applied the technique from the video to #6, but I get an answer that is too large, could my loop be incorrect? In the video lecture, I understand the algebra steps in #6, but why is  $0! = 1$ ? Is anyone else getting different answers to #6? It seems to depend on which method I use. (notice the student is not posting the solution)

Any post that interferes with fellow student learning is not acceptable.

Any posts, regardless of intent, that could cause abuse, obstruction, disruption, or interference with student learning, including posts that are disrespectful, aggressive, distracting or inappropriate, will be saved and deleted at the discretion of the course instructor. Such comments will be reported on Student Conduct & Conflict Resolution. Please note that there are many ways a post can interfere with student learning. If you have doubts about your message, please edit. For example, sarcasm doesn't translate well into text and could be a problem. Additionally, calling out specific students' performance or telling others how to do/work around a problem (ie: Hardcoding or providing links to answers)

## What are ZOOM Office Hours?

It is much like a classroom. It is a live web session to ask questions, explore further, discussion strategies, explore related topics and support your classmates and contribute to the class. Office hours are optional.

## How do we use ZOOM Office Hours?

Discuss class content directly with the instructor and other students. Practice professional collaboration strategies. Instructors may use break out groups or/and guide discussions, at their discretion. Instructors decide which topics will be discussed based on what will optimize learning. Please wear clothes and be aware of your environment.

## What ZOOM Office Hours are not?

Answer forum. Tutoring session. Instructors cannot help you completely debug your code. The instructor may not reply to all inquiries and let other students speak as appropriate.

Questions should be specific and reflect an effort on the student's behalf. Sample questions that are not content-specific and hence not appropriate. Tell me how to do #6 Please explain #6 I'm lost on #6, Help!

Sample questions that are content-specific. I applied the technique from the video to #6, but I get an answer that is too large, could my loop my incorrect? In the video lecture, I understand the algebra steps in #6, but why is  $0! = 1$ ? Is anyone else getting different answers to #6? It seems to depend on which method I use. (notice the student is not sharing the solution)

Any behavior that interferes with student learning or university activities is not acceptable.

Any behavior, regardless of intent, that could cause abuse, interference, obstruction, disruption, or interference with student learning, including comments that are disrespectful, aggressive, distracting, off-topic or inappropriate, will not be tolerated and may result in being muted, at the instructor's discretion. Such behavior will be reported to Student Conduct and Conflict Resolution. For example, dominating group discussions can inhibit others opportunity to learn and will not be allowed.

## What is CU Email?

Your CU email account is the official university method of communication. Enable settings in your account to ensure you see and read all email. Set aside a time each day to read email.

## Individual Check-In

If you have a unique situation that may be affecting your work or class experience -or-

you need clarification of an email, Piazza, or ZOOM exchange, please email your instructor with the subject line "Individual Check-In". Your instructor will email you back to set up a Zoom call to discuss the specific situation and work with you to develop a solution and/or strategy to move forward.

# Service Interruptions and Support

Due to the online nature of the program, there is always the possibility of service interruptions. If you are unable to access the course materials (Moodle, Piazza, etc), we encourage you to visit <https://www.isitdownrightnow.com/applied.cs.colorado.edu.html>.

For non-urgent issues relating to platform support, please contact [cscihelp@colorado.edu](mailto:cscihelp@colorado.edu).

For urgent issues, for example, attempting to upload a homework assignment near a deadline, email your instructor directly.

In cases of documented exceptional illness or circumstances affecting assignments, instructors may or may not offer an alternative assessment (which may differ in form or content) at the instructor's discretion. Please consult the campus policy for medical leave if needed.

## Collaboration Policy

We welcome collaboration! Sharing insights, asking questions, learning by doing, and learning by helping others are essential skills in learning computer science.

Collaboration is discussing ideas of the course with others, sharing insights and extra resources, working through similar questions to an assignment, sharing resources, and helping others. The Piazza forum in your class is an ideal place to share ideas, lead a discussion or be the hero that asks the "dumb question" everyone else is afraid to ask. And Piazza is often a source for content for instructors to include in letters of recommendations. Your leadership, courage, and determination will not go unnoticed.

Collaboration is not:

- "Having a partner." In particular, Group Projects, or projects that specify "working with a partner" will have individual guidelines.
- One student solving problems 1-4, and another solving 6-10.
- An identical group solution submitted by multiple students.

Unless specified in the assignment, all submitted coursework is individual.

In general:

- You must document resources and collaboration on any assignment. This should be in the form of comments at the start of code and/or within solution notes.
- Cite Your Sources: If you collaborated with someone on an assignment, or if your submission includes quotes from a book, a paper, or a web site, you must clearly acknowledge the source.
- Plagiarism is forbidden. Copying answers directly or indirectly from solution manuals, web pages, or your peers is a violation of honor code. The assignments and code that you turn in should be written entirely on your own.
- Copying/soliciting a solution to a problem from the internet or another classmate constitutes a violation of the course's collaboration policy and the honor code and may have serious consequences.
- You may not actively search for a solution to the problem from the internet. This includes posting to sources like StackOverflow, Reddit, Chegg, CourseHero, etc.
- StackExchange Clarification: Searching for basic techniques in Python/C++ is totally fine.
- If you have taken this course prior to this semester and have done some/all of homeworks previous code or previous homework solutions may not be reused. You must start each homework from scratch.
- When in doubt, ask. If something doesn't seem right - you are not sure if you can use a resource or if you are feeling pressure to share a specific solution - please reach out to your instructor.
- Note: Other information on the Honor Code can be found at [www.colorado.edu/policies/honor.html](http://www.colorado.edu/policies/honor.html) and <https://www.colorado.edu/sccr/honor-code>.

## Final Projects

We understand students taking multiple courses may have more than one Final Project due at the end of the semester.

To give students flexibility in preparing and submitting their projects:

- All CSPB Final Projects are due by the established deadline, but may be turned in at any point during the Submission Window.
- Final Projects will be available three weeks or more before the final day of classes.

## Classroom Behavior

Students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote, or online. Failure 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 race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation, or political philosophy.

For more information, see the [classroom behavior policy](#), the [Student Code of Conduct](#), and the [Office of Institutional Equity and Compliance](#).

## Requirements for Infectious Diseases

Members of the CU Boulder community and visitors to campus must follow university, department, and building health and safety requirements and all public health orders to reduce the risk of spreading infectious diseases.

The CU Boulder campus is currently mask optional. However, if masks are again required in classrooms, students who fail to adhere to masking requirements will be asked to leave class. Students who do not leave class when asked or who refuse to comply with these requirements will be referred to Student Conduct & Conflict Resolution. Students who require accommodation because a disability prevents them from fulfilling safety measures related to infectious disease will be asked to follow the steps in the "Accommodation for Disabilities" statement on this syllabus.

For those who feel ill and think you might have COVID-19 or if you have tested positive for COVID-19, please stay home and follow the [further guidance of the Public Health Office](#). For those who have been in close contact with someone who has COVID-19 but do not have any symptoms and have not tested positive for COVID-19, you do not need to stay home.

## Accommodation for Disabilities, Temporary Medical Conditions, and Medical Isolation

[Disability Services](#) determines accommodations based on documented disabilities in the academic environment. If you qualify for accommodations because of a disability, submit your accommodation letter from Disability Services to your faculty member in a timely manner so your needs can be addressed. Contact Disability Services at 303-492-8671 or [dsinfo@colorado.edu](mailto:dsinfo@colorado.edu) for further assistance.

If you have a temporary medical condition or required medical isolation for which you require accommodation or if you do face any illness which is affecting your class performance, please let me know by email ASAP. Also see [Temporary Medical Conditions](#) on the Disability Services website.

## Preferred Student Names and Pronouns

CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.

## Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the [Honor Code](#). Violations of the Honor Code may include but are not limited to: plagiarism (including use of paper writing services or technology [such as essay bots]), cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty.

All incidents of academic misconduct will be reported to Student Conduct & Conflict Resolution: [honor@colorado.edu](mailto:honor@colorado.edu), 303-492-5550. Students found responsible for violating the [Honor Code](#) will be assigned resolution outcomes from the Student Conduct & Conflict Resolution as well as be subject to academic sanctions from the faculty member. Visit [Honor Code](#) for more information on the academic integrity policy.

## Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. University policy prohibits [protected-class](#) discrimination and harassment, sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, and related retaliation by or against members of our community on- and off-campus. These behaviors harm individuals and our community. The Office of Institutional Equity and Compliance (OIEC) addresses these concerns, and individuals who believe they have been subjected to misconduct can contact OIEC at 303-492-2127 or email [cureport@colorado.edu](mailto:cureport@colorado.edu). Information about university policies, [reporting options](#), and support resources can be found on the [OIEC website](#).

Please know that faculty and graduate instructors have a responsibility to inform OIEC when they are made aware of incidents related to these policies regardless of when or where something occurred. This is to ensure that individuals impacted receive an outreach from OIEC about their options for addressing a concern and the support resources available. To learn more about reporting and support resources for a variety of issues, visit [Don't Ignore It](#).

## Religious Holidays

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 attendance. In this class, please let me know via email at least 1 week beforehand to resolve the schedule conflict.

See the [campus policy regarding religious observances](#) for full details.

## Mental Health and Wellness

Free and unlimited telehealth is available through [Academic Live Care](#). Please note that at this time this service is not available to students outside of the United States.

Last modified: Tuesday, 9 January 2024, 12:16 PM

You are logged in as Taylor Larrechea (Log out)

[Data retention summary](#)

[cscihelp@colorado.edu](mailto:cscihelp@colorado.edu)