

CSCI 3753: Design and Analysis of Operating Systems - Fall 2020

Instructor: CJ Herman
Email: CJ.Herman@Colorado.EDU
Office Hours: See Canvas for current office hours
Class Time / Location: TuTh 12:45 – 2:00pm / Remote

Description:

This course introduces important Operating Systems concepts. The course will cover key aspects of how an operating system functions on a modern computer. The following major topics will be covered:

System Calls, Device Drivers and DMA
Processes and Threads
Interprocess Communication

Scheduling and Synchronization
Virtual Memory and Paging
Disk Hardware and Filesystems

In addition, the class will gain familiarity with important software tools such as debuggers, compilers, editors, kernel modules, and virtual machines.

Textbook:

Operating System Concepts, 9th or 10th Edition, Abraham Silberschatz, Peter Galvin, Greg Gagne

Course Website:

All of your class interactions will be available through [Canvas](#).

Grade Breakdown:

20%	Problem Sets and Quizzes
40%	Programming Assignments (4)
40%	Exams (2)

Assignment of letter grades is made by the instructor at the end of the course based on your cumulative weighted percentage. The scale upon which this final assignment is made is A \geq 90%, B \geq 80%, C \geq 70%, and D \geq 60%. The instructor reserves the right to alter this curve as needed. The instructor also has discretion to apply +’s and -’s and to modify letter grades for reasons other than course scores, e.g. violations of the honor code, class attendance, student participation and other behaviors.

Submission Deadlines:

Late work is not accepted without a documented personal, family, or medical emergency. Assignments will generally be due on or before 11:59PM on the due date. If you miss the 11:59PM submission time, your assignment will not be accepted.

Grading for Programming Assignments:

Approximately 50% of the Programming Assignment (PA) grade will be based on the code submitted (ie. does it compile, does it execute the required functions) and about 50% of the grade will be based on answering questions from the TA during an interview (questions may be based on explaining the code and/or explaining software concepts that the PA covers).

Code:

Programming Assignments must be submitted by uploading your code to Canvas by the due date. All PAs must be written in C and compiled for execution in the specified environment for that PA, unless otherwise noted. No late submissions will be accepted. If you submit your assignment late, you will receive a zero for the code portion of the assignment. You are highly encouraged to submit running programs that have partially completed functionality for partial credit.

Interview:

Each student must arrange an individual grading interview with a TA for each Programming Assignment. Interview time slots will be posted on Canvas. You must bring your laptop to these grading sessions to demonstrate your program to the TA and answer questions. Any missed meetings (without notifying your TA ahead of time with a suitable reason) may result in a zero grade for the interview portion of the assignment. The TAs are under no obligation to reschedule your appointment if you miss your meeting.

Tentative Schedule:

Week	Topic	Reading	
		9th Edition	10th Edition
1	Machine Components, Boot Loader, Kernel Mode, System Calls, Virtual Machines (VM)	Ch. 1, 2	Ch. 1, 2
2	Bus, Controllers, Direct Memory Access (DMA), Device Drivers, LKMs	Ch. 2, 13.1-13.4	Ch. 2, 12.1-12.4
3	Processes, Interprocess Communication (IPC)	Ch. 3	Ch. 3
4	Threads	Ch. 4, 5	Ch. 4, 6
5	Thread Safe and Reentrant Code, Synchronization	Ch. 4, 5	Ch. 4, 6
6	Mutual Exclusion, Synchronization Monitors, Conditional Variables	Ch. 5	Ch. 7
7	Deadlock (Conditions, Detection, Avoidance)	Ch. 7	Ch. 8
8	Midterm Review & Exam	Review	
9	Scheduling Processes and Tasks, Performance Criteria	Ch. 6	Ch. 5
10	Memory Management	Ch. 8	Ch. 9
11	Paging, Page Replacement	Ch. 8, 9	Ch. 9, 10
12	Memory Allocation	Ch. 8, 9	Ch. 9, 10
12	On-Demand Paging, Virtual Memory	Ch. 8, 9	Ch. 9, 10
13	Disk hardware, Disk R/W scheduling, Flash drives, RAID File Systems	Ch. 10, 11	Ch. 11, 13
14	File Allocation, Free Space Management, File Systems, Distributed File Systems	Ch. 12, 17	Ch. 14, 19
15	Final Review	Review	

Accommodation for Disabilities

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the [Disability Services website](#). Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition or injury, see [Temporary Medical Conditions](#) under the Students tab on the Disability Services website.

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 race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. 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 [classroom behavior](#) and the [Student Code of Conduct](#).

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 policy may include: plagiarism, 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 the Honor Code (honor@colorado.edu; 303-492-5550). Students who are found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found at the [Honor Code Office website](#).

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

The University of Colorado Boulder (CU Boulder) is committed to fostering a positive and welcoming learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct, intimate partner abuse (including dating or domestic violence), stalking, or protected-class discrimination or harassment by members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or cureport@colorado.edu. Information about the OIEC, university policies, [anonymous reporting](#), and the campus resources can be found on the [OIEC website](#).

Please know that faculty and instructors have a responsibility to inform OIEC when made aware of incidents of sexual misconduct, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about options for reporting and support resources.

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.

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