

CSC 139 Operating System Principles

Fall 2021 Syllabus

Part 1: Course Information

Instructor Information

Instructor: Yuan Cheng

Office Hours: Mon 2 pm – 3 pm, Fri 2 pm – 4 pm, or by appointment

E-mail: yuan.cheng@csus.edu (Please include [CSC 139] in the subject line.)

Online Communication Information

Section 4: <https://csus.zoom.us/j/84680772901>

Section 5: <https://csus.zoom.us/j/89556327967>

Section 6: <https://csus.zoom.us/j/88501880601>

Office Hours: <https://csus.zoom.us/j/9756375621>

Slack: <https://csuscsc139fall2021.slack.com>

Course Description

Concepts, principles, fundamental issues, organization and structure of contemporary operating systems. Topics include processes, threads, concurrency, parallelism on multi-processor and multi-core systems, CPU scheduling, inter-process communication and synchronization, deadlocks, real and virtual memory management, device management, file systems, security, and protection.

Prerequisite

CSC 60, CSC 130 and either CSC 137 or CpE 185.

Textbook & Course Materials

Required Text

A. Silberschatz, P. Galvin, and G. Gagne, Operating System Concepts, 10th edition, Wiley, 2018. ISBN: 978-1-119-32091-3

Part 2: Course Objectives

Course Outcomes

Students completing this course will be able to:

1. Explain the principles of concurrency and the trade-offs in synchronization approaches, and apply different synchronization approaches to the critical section problem and to process coordination.
2. Articulate different methods for handling deadlocks and starvations.
3. Grasp issues, principles, performance criteria, and pros/cons of various operating system algorithms for managing different types of system resources.
4. Write multi-process and multi-thread programs to solve concurrency control and synchronization problems using various types of system calls, API calls, semaphores, mutex locks, condition variables, and IPC methods in Unix/Linux environments.
5. Identify the security issues in operating systems and how to design around them.
6. Fully explain how a process and its memory are managed by an operating system.
7. Demonstrate knowledge of virtualization of computing hardware.
8. Give detailed information about file systems in modern operating systems.

Student Outcomes

This course contributes to the following student outcomes. Graduates should be able to:

2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions.

Part 3: Topic Outline/Schedule

This is a tentative outline and schedule. It is subject to change.

Outline

Here is a brief list of topics that will be covered in the course.

1. Processes and threads.
2. Process synchronization, including race conditions, the critical section problem and its solutions.
3. Deadlocks and starvation.
4. Processor scheduling and real-time scheduling.
5. Memory management and virtual memory.
6. File system and disk scheduling.
7. I/O systems.
8. Protection and security.

Weekly Schedule

Week	Date	Topic	Reading	Notes
1	8/31	Course Overview		Opening Day Quiz
	9/2	Introduction	Ch. 1	
2	9/7	Introduction (cont.); Operating System Structures	Ch. 2	
	9/9	Operating System Structures (cont.)		
3	9/14	Processes	Ch. 3	
	9/16	Processes (cont.)		
4	9/21	Processes (cont.)		
	9/23	Threads and Concurrency	Ch. 4	
5	9/28	Threads and Concurrency (cont.)		9/27 Census Date
	9/30	CPU Scheduling	Ch. 5	Quiz 1
6	10/5	CPU Scheduling (cont.)		

	10/7	CPU Scheduling (cont.)		
7	10/12	Midterm 1		
	10/14	Synchronization Tools	Ch. 6	
8	10/19	Synchronization Tools (cont.); Synchronization Examples	Ch. 7	
	10/21	Synchronization Examples (cont.)		
9	10/26	Deadlocks	Ch. 8	
	10/28	Deadlocks (cont.)		
10	11/2	Main Memory	Ch. 9	
	11/4	Main Memory (cont.)		Quiz 2
11	11/9	Virtual Memory	Ch. 10	
	11/11	Veteran's Day – No class		
12	11/16	Virtual Memory (cont.)		
	11/18	Mass-Storage Structure	Ch. 11	11/19 Final Day to Withdraw
13	11/23	Midterm 2		
	11/25	Thanksgiving Day – No class		
14	11/30	Mass-Storage Structure (cont.); I/O	Ch. 12	
	12/2	File Systems	Ch. 13, 14, 15	
15	12/7	File Systems (cont.)		
	12/9	Wrap-up		
Finals		TBA		

Part 4: Grading Policy

Graded Course Activities

This course will consist of a midterm, a final exam, several lab assignments, and a project that contribute to the final grade in the following proportions:

30%	Midterm Exams (15% × 2)
20%	Final Exam
28%	Programming Assignments
10%	Homework Assignments
4%	Quizzes
8%	Participation

Generally, the assignments will be a direct application of the materials covered in class. I may also assign you some of the exercises in the textbook.

Letter Grade Assignment

The final letter grade will be *roughly* based on the final percentage as follows:

Letter Grade	Percentage	Performance
A	93-100%	Excellent Work
A-	90-92%	Nearly Excellent Work
B+	87-89%	Very Good Work
B	83-86%	Good Work
B-	80-82%	Mostly Good Work
C+	77-79%	Above Average Work
C	73-76%	Average Work
C-	70-72%	Mostly Average Work
D+	67-69%	Below Average Work
D	60-66%	Poor Work
F	0-59%	Failing Work

Important note: For more information about grading at Sac State, visit the academic policies and grading section of the university catalog.

Part 5: Course Policies

Attend Class

Attendance to class is expected. Class roll will not be checked after first two weeks. However, you are responsible for material presented and announcements made in class or on Canvas. This could include changes to the syllabus, exam dates, etc.

You will not be penalized for absences unless you are unable to complete course learning outcomes. You will not be asked to provide the instructor formal documentation from a healthcare provider.

Build Rapport

If you find that you have any trouble keeping up with assignments or other aspects of the course, make sure you let your instructor know as early as possible. As you will find, building rapport and effective relationships are key to becoming an effective professional. Make sure that you are proactive in informing your instructor when difficulties arise during the semester so that they can help you find a solution.

Complete Assignments

You will work on all assignments by yourself. All assignments for this course will be submitted electronically through Canvas unless otherwise instructed. Assignments must be submitted by the given deadline or special permission must be requested from instructor *before the due date*.

If COVID related illness/exposure results in any missed course work, you should *proactively work with the instructor to plan make-up work*. It remains your responsibility to complete any missed work. But please realize that class will continue, and you may find yourself in the situation where you are unable to complete all work by the end of the semester. In such a case, you should consider a late withdrawal or an incomplete grade.

Late Assignments

Late assignment will be penalized by 15% per day. Nothing will be accepted if more than 72 hours late, or if solution has been posted. However, you will receive a budget of 5 grace days for the course.

Grace days are a tool to allow you to manage your time in the face of personal issues and to help smooth out burstiness in assignment due dates across classes. They are for when you are sick, when a short-term emergency arises, when you have too many deadlines all at once,

etc. You should not anticipate additional deadline leniency. We strongly recommend that you conserve your grace days, saving them for the more difficult assignments at the end of the term. Grace days are applied automatically until you run out. You cannot choose how to distribute your grace days among your assignments.

Make-up Exams

Make-up exams will only be given under extreme circumstances. The instructor *reserves the right* to reject make-up requests. There will be *no* make-up for unannounced quizzes under any circumstances.

Understand When You May Drop This Course

Although instructors may exercise their authority to administratively remove any student who fails to attend during the first two weeks of instruction, students should not assume they will be dropped. Students will receive a final grade of "F" or "WU" in courses they fail to drop officially.

- Students wishing to withdraw from **all** courses should fill out the Semester Withdrawal Form.
- Until the end of the second week of instruction of the semester, students are expected to drop courses by using "My Sac State" (<https://my.csus.edu/>). Students will be charged registration fees for all courses not dropped prior to the first day of instruction. The drop in units refund deadline is the end of the second week of instruction.
- Drops during the third and fourth weeks of instruction are processed in the academic department offering the course and require instructor and department chair approval. Forms are available at academic department offices, or at the Office of the Registrar's website (<https://www.csus.edu/student-life/class-schedules/internal/documents/petitiontoadddropwithdraw.pdf>).

Incomplete Policy

Under emergency/special circumstances, students may petition for an incomplete grade. It is the responsibility of the student to bring pertinent information to the attention of the instructor and to determine from the instructor the remaining course requirements that must be satisfied to remove the Incomplete. A final grade is assigned when the work agreed upon has been completed and evaluated. All incomplete course assignments must be completed within 12 months.

Inform Your Instructor of Any Accommodations Needed

Sacramento State is committed to ensuring an accessible learning environment where course or instructional content are usable by all students and faculty. If you believe that you require disability-related academic adjustments for this class (including pregnancy-related disabilities), please immediately contact Services for Students with Disabilities (SSWD) to discuss eligibility. A current accommodation letter from SSWD is required before any modifications, above and beyond what is otherwise available for all other students in this class will be provided. Please be advised that disability-related academic adjustments are not retroactive. SSWD is located on the first floor of Lassen Hall 1008. Phone is 916-278-6955 and e-mail is sswd@csus.edu. For a complete listing of services and current business hours, visit the [Services for Students With Disabilities](#) website.

Basic Needs Support

If you are experiencing challenges with food, housing, financial, or other unique circumstances that are impacting your education, help is just a phone call or email away! The CARES office provides case management support for any enrolled student. Email the CARES office at cares@csus.edu to speak with a case manager about the resources available to you. Check out the [CARES](#) website.

Health and Safety Information

Your physical and mental health are important to your success as a college student. Student Health and Counseling Services (SHCS) in The WELL offers medical, counseling, and wellness services to help you get and stay healthy during your time at Sac State. SHCS offers: Primary Care medical services, including sexual and reproductive healthcare, transgender care, and immunizations; urgent care for acute illness, injuries, and urgent counseling needs; pharmacy for prescriptions and over-the-counter products; mental health counseling, including individual sessions, group counseling, support groups, mindfulness training, and peer counseling; athletic training for sports injury rehabilitation; wellness services, including nutrition counseling, peer-led health education and wellness workshops, and free safer sex supplies; violence and sexual assault support services. Most services are covered by the Health Services fee and available at no additional cost.

If you are sick, stay home. Notify your instructor. Please self-diagnose if you are experiencing any COVID-like symptoms (fever, cough, sore throat, muscle aches, loss of smell or taste, nausea, diarrhea, or

headache) or have had exposure to someone who has tested positive for COVID. Contact Student Health & Counseling Services (SHCS) at (916) 278-6461 to receive guidance and/or medical care. The CDC provides a good source of information regarding COVID-19 and a way to self-check symptoms: <https://www.cdc.gov/coronavirus/2019-ncov/index.html>

Zoom Netiquette

- Be punctual.
- Test all technology (e.g., microphone, speaker/headset, Wi-Fi) before the class.
- Mute your audio if you are not speaking.
- "Raise hand" and wait to be called upon.
- Don't interrupt other people when they're speaking (or attempt to speak over them).
- Although live access to your webcam is not required in this class, present a professional image as if video is used.
- If you need to share your screen, make sure to close any windows not related to the class. Avoid "screen shuffling" and any potentially embarrassing moments if possible.
- Keep the chatroom appropriate.

Commit to Integrity

As a student in this course (and at this university) you are expected to maintain high degrees of professionalism, commitment to active learning and participation in this class and also integrity in your behavior in and out of the classroom.

Sac State's Academic Honesty Policy & Procedures

"The principles of truth and honesty are recognized as fundamental to a community of scholars and teachers. California State University, Sacramento expects that both faculty and students will honor these principles, and in so doing, will protect the integrity of academic work and student grades."

Read more about Sac State's [Academic Honesty Policy & Procedures](#)

Definitions

At Sac State, "**cheating** is the act of obtaining or attempting to obtain credit for academic work through the use of any dishonest, deceptive, or fraudulent means."

"**Plagiarism** is a form of cheating. At Sac State, plagiarism is the use of distinctive ideas or works belonging to another person without

providing adequate acknowledgement of that person's contribution."

Important Note: Any form of academic dishonesty, including cheating and plagiarism, may be reported to the office of student affairs.

Course policies are subject to change. It is the student's responsibility to check Canvas for corrections or updates to the syllabus. Any changes will be posted in Canvas.