Computer Science/Engineering and Computer Science

CSC 139 Operating System Principles
Fall 2019 Syllabus

Part 1: Course Information

Instructor Information

Instructor: Yuan Cheng
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Course Description

Contemporary operating system organization and structure. Topics include: process and thread, concurrency, scheduling, inter-process communication and synchronization, deadlock, real and virtual memory management, device management, file systems, network and distributed operating 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 Outcomes

Course Outcomes

Students completing this course will be able to

1. Understand principles of concurrency and trade-offs in synchronization approaches and apply different synchronization approaches to the critical section problem and to the process coordination.

2. Apply appropriate methods in handling deadlocks and starvations.

3. Grasp issues, principles, performance criteria, and pros/cons of various algorithms and methods in different types of computer resource management.

4. Write multi-process and multi-thread programs to solve concurrency control and synchronization problems using various types of system calls, pthread library calls, semaphores, mutex locks, condition variables, and IPC methods in Unix/Linux environments.

5. Understand security issues of operating systems and how to design around them.

6. Fully explain how processes and its memory is managed in an operating system.

7. Demonstrate knowledge in virtualization of computing hardware.

8. Provide detailed information about file systems in modern computers.

Student Outcomes

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

1. Apply fundamental knowledge of mathematics, algorithmic principles, computer theory, and principles of computing systems in the modeling and design of computer-based systems that demonstrate an understanding of tradeoffs involved in design choices;
2. Analyze a problem, specify the requirements, design, implement, and evaluate a computer-based system, process, component, or program that satisfies the requirements;
3. Use current skills, techniques, and tools necessary for computing practice;
4. Understand professional, ethical, and security issues and responsibilities.

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. Race condition, the critical section problem and its solutions.
3. Deadlock and starvation.
4. Processor scheduling and real-time scheduling.
5. Memory management and virtual memory.
6. File system, disk scheduling and RAID.
7. I/O systems.
8. Network and distributed operating systems.
9. Protection and security.

Weekly Schedule

Week	Date	Topic	Reading
1	8/26	Course Overview; Opening Day Quiz	
	8/28	Introduction	Ch. 1, 2
2	9/2	Labor Day – No class	
	9/4	Processes	Ch. 3
3	9/9	Processes (cont.)	
	9/11	Threads and Concurrency	Ch. 4
4	9/16	Threads and Concurrency (cont.); CPU Scheduling	Ch. 5
	9/18	Quiz 1; CPU Scheduling (cont.)	
5	9/23	CPU Scheduling (cont.); Synchronization Tools	Ch. 6
	9/25	Synchronization Tools (cont.)	
6	9/30	Midterm 1	
	10/2	Midterm 1 Debrief	

7	10/7	Synchronization Examples	Ch. 7
	10/9	Synchronization Examples (cont.)	
8	10/14	Deadlocks	Ch. 8
	10/16	Deadlocks (cont.)	
9	10/21	Quiz 2; Main Memory	Ch. 9
	10/23	Main Memory (cont.)	
10	10/28	Virtual Memory	Ch. 10
	10/30	Virtual Memory (cont.)	
11	11/4	Mass-Storage Structure	Ch. 11
	11/6	I/O	Ch. 12
12	11/11	Veteran's Day – No class	
	11/13	Midterm 2	
13	11/18	Midterm 2 Debrief; File Systems (1)	Ch. 13
	11/20	File Systems (2)	Ch. 14
14	11/25	File Systems (3)	Ch. 15
	11/27	Protection & Security	Ch. 16, 17
15	12/2	Quiz 3; Protection & Security (cont.)	
	12/4	Wrap-up	
Finals		TBA	

Part 4: Grading Policy

Graded Course Activities

This course will consist of two midterms, a final exam, three quizzes, three homework assignments, and five programming assignments that contribute to the final grade in the following proportions:

30%	Midterm Exams (15% × 2)
20%	Final Exam
30%	Programming Assignments
10%	Homework Assignments
6%	Quizzes
4%	Attendance/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 **percentile** as follows:

Letter Grade	**Percentile**	**Performance**
A	91-100th	Excellent Work
A-	81-90th	Nearly Excellent Work
B+	71-80th	Very Good Work
B	56-70th	Good Work
B-	46-55th	Mostly Good Work
C+	36-45th	Above Average Work
C	21-35th	Average Work
C-	11-20th	Mostly Average Work
D	6-10th	Poor Work
F	0-5th	Failing Work

Part 5: Course Policies

Attend Class

Attendance to class is expected. Class roll will not be checked after first two weeks unless the instructor deems it necessary. 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.

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*.

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

If you have a documented disability and verification from the Office of Services to Students with Disabilities (SSWD), and wish to discuss academic accommodations, please contact your instructor as soon as possible. It is the student's responsibility to provide documentation of disability to SSWD and meet with a SSWD counselor to request special accommodation *before* classes start.

SSWD is located in Lassen Hall 1008 and can be contacted by phone at (916) 278-6955 (Voice) (916) 278-7239 (TDD only) or via email at sswd@csus.edu.

Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In case of conflict with a test, please let me know at least two weeks in advance.

Basic Needs Support

If you are experiencing challenges in food and/or stable housing, help is just a click, email or phone call away! Sacramento State offers basic needs support for students who are experiencing challenges in these areas. Please visit our Basic Needs website to learn more about your options and resources available. https://www.csus.edu/student-affairs/crisis-assistance-resource-education-support/

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.