San José State University
Computer Science Department
CS 149, Operating Systems, Section 02, Spring 2022

Course and Contact Information

Instructor:	Dr. Faramarz **Mortezaie**
Email:	faramarz.mortezaie@sjsu.edu

Office Hours: Thursday at 3:00 PM to 4:00 PM or By Appointment – Online
Office hour Zoom Link: https://sjsu.zoom.us/j/83687960307

Lecture: TTH 7:30 - 8:45 AM

Classroom: **MacQuarrie Hall 222**

Prerequisite: CS 146 or SE 146 (with a grade of "C-" or better)

Computer Science, Applied and Computational Math or Software Engineering Majors only; or Instructor Consent.

Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on Canvas Leaning Management System course login website at http://sjsu.instructure.com. You are responsible for regularly checking with the messaging system through MySJSU at http://my.sjsu.edu (or other communication system as indicated by the instructor) to learn of any updates.

Course Description

Fundamentals: Contiguous and non-contiguous memory management; processor scheduling and interrupts; concurrent, mutually exclusive, synchronized and deadlocked processes; files. Substantial programming project required.

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Course Learning Objectives (CLO)

Course Learning Outcomes (CLO)

Upon successful completion of this course, students will be able to:

- Understand the role that the operating system software plays in the management of the various hardware subsystems of the computer system.
- Understand locality of memory reference and how it is used to perform effective memory hierarchy management.
- Understand the various mapping, replacement, and dynamic allocation algorithms for cache and virtual memory management.
- Understand the alternative CPU scheduling schemes, their tradeoffs, and their applications to other queue processing situations.
- Appreciate the difficult tradeoffs faced when attempting to deal with the resource deadlock problem and distinguish between the different deadlock prevention and avoidance schemes and understand why and how deadlocks can still happen today.
- Understand software race conditions, their origin and the problems they can cause, along with knowing how to apply semaphores in software design to solve the race condition problem.
- Understand the various issues associated with the operating system's role in performing I/O and file management.

Required Texts/Readings Textbook

Silberschatz, P. Galvin, and G. Gagne,Operating System Concepts,10/E. Wiley, April 2018. ISBN-13:9781119127482.

Other Readings

W. Stallings, Operating Systems: Internals and Design Principles, 9/E. Pearson, 2018. ISBN-13: 9780134670959.

Course Requirements and Assignments

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in University Policy S12-3 at http://www.sjsu.edu/senate/docs/S12-3.pdf.

Homework, Midterm and Final exam are expected for this class. Each assigned problem requires a solution and an explanation (or work) detailing how you arrived at your solution. Cite any outside sources used to solve a problem. When grading an assignment, I may ask for additional information.

NOTE that University policy F69-24 at http://www.sjsu.edu/senate/docs/F69-24.pdf states that "Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but

because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading."

Grading

Homework, Weekly Quiz, discussion and project	25%
Exam-1	25%
Exam-2	25%
Comprehensive Final Exam	25%

The final and exams have fixed dates and can only be taken in the classroom during class time. Makeup exams will only be given in cases of illness (with signed documentation from a medical facility – original copy). Exams are closed book, closed notes, closed neighbor and comprehensive. The final exam is cumulative.

Late work policy: No late assignment will be accepted.

Course Grading Standards

A+	98 – 100%
A	93 – 97%
A-	90 – 92%
B+	88 – 89%
B	83 – 87%
B-	80 – 82%

C+   78 – 79%
C   73 – 77%
C-   70 – 72%

D+   68 – 69%
D   63 – 67%
D-   60 – 62%

F   59% and less

Note that "All students have the right, within a reasonable time, to know their academic scores, to review their grade-dependent work, and to be provided with explanations for the determination of their course grades." See University Policy F13-1 at http://www.sjsu.edu/senate/docs/F13-1.pdf for more details.

Classroom Protocol

Attendance
Students are expected to attend all the lectures.

Use of Camera in Class

Using camera during lecture is optional. But during the exams and weekly quizzes, you must turn on your webcam. If you there are any issues, please let me know in advance.

Recording of Zoom Classes

It is strongly recommended that you attend all the zoom meetings. Just in case you cannot attend a zoom lecture, zoom lectures will be recorded and recordings will be posted on Canvas. If there are technical issues with zoom recordings, the topics discussed will be posted.

Students are not allowed to record without instructor permission
Students are prohibited from recording class activities (including class lectures, office hours, advising sessions, etc.), distributing class recordings, or posting class recordings. Materials created by the instructor for the course (syllabi, lectures and lecture notes, presentations, etc.) are copyrighted by the instructor. This university policy (S12--7) is in place to protect the privacy of students in the course, aswell as to maintain academic integrity through reducing the instances of cheating. Students who record, distribute, or post these materials will be referred to the Student Conduct and Ethical Development office. Unauthorized recording may violate university and state law. It is the responsibility of students that require special accommodations or assistive technology due to a disability to notify the instructor.

Proctoring Software and Exams
Exams will be proctored in this course through Respondus Monitor and LockDown Browser. Please note it is the instructor's discretion to determine the method of proctoring. If cheating is suspected the proctored videos may be used for further inspection and may become part of the student's disciplinary record. Note that the proctoring software does not determine whether academic misconduct occurred, but does determine whether something irregular occurred that may require further investigation. Students are encouraged to contact the instructor if unexpected interruptions occur during an exam.

Technical difficulties Internet connection issues

Canvas AutoSaves responses a few times per minute as long as there is an internet connection. If your internet connection is lost, Canvas will warn you but allow you to continue working on your exam. A brief loss of internet connection is unlikely to cause you to lose your work. However, a longer loss of connectivity or weak/unstable connection may jeopardize your exam. Other technical difficulties: Immediately email the instructor a current copy of the state of your exam and explain the problem you are facing. Your instructor may not be able to respond immediately or provide technical support. However, the copy of your exam and email will provide a record of the situation.

Contact the SJSU technical support for Canvas:

> Technical Support for Canvas
> Email: ecampus@sjsu.edu
> Phone: (408) 924--2337
> https://www.sjsu.edu/ecampus/support/

If possible, complete your exam in the remaining allotted time, offline if necessary. Email your exam to your instructor within the allotted time or soon after.

Zoom Classroom Etiquette
- Mute Your Microphone: To help keep background noise to a minimum, make sure you mute your microphone when you are not speaking.
- Be Mindful of Background Noise and Distractions: Find a quiet place to "attend" class, to the greatest extent possible.
  - Avoid video setups where people may be walking behind you, people talking/making noise, etc.
  - Avoid activities that could create additional noise, such as shuffling papers, listening to music in the background, etc.
- Position Your Camera Properly: Be sure your webcam is in a stable position and focused at eye level.
- Limit Your Distractions/Avoid Multitasking: You can make it easier to focus on the meeting by turning off notifications, closing or minimizing running apps, and putting your smartphone away (unless you are using it to access Zoom).
- Use Appropriate Virtual Backgrounds: If using a virtual background, it should be appropriate and professional and should NOT suggest or include content that is objectively offensive or demeaning.

University Policies

General Expectations, Rights and Responsibilities of the Student
As members of the academic community, students accept both the rights and responsibilities incumbent upon all members of the institution. Students are encouraged to familiarize themselves with SJSU's policies and practices pertaining to the procedures to follow if and when questions or concerns about a class arises. See University Policy S90–5 at http://www.sjsu.edu/senate/docs/S90-5.pdf. More detailed information on a variety of related topics is available in the SJSU catalog, at http://info.sjsu.edu/web-dbgen/narr/catalog/rec-12234.12506.html. In general, it is recommended that students begin by seeking clarification or discussing concerns with their instructor. If such conversation is not possible, or if it does not serve to address the issue, it is recommended that the student contact the Department Chair as a next step.

Dropping and Adding
Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's Catalog Policies section at http://info.sjsu.edu/static/catalog/policies.html. Add/drop

deadlines can be found on the current academic year calendars document on the [Academic Calendars webpage](#) at http://www.sjsu.edu/provost/services/academic_calendars/. The [Late Drop Policy](#) is available at http://www.sjsu.edu/aars/policies/latedrops/policy/**.** Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the [Advising Hub](#) at http://www.sjsu.edu/advising/.

Consent for Recording of Class and Public Sharing of Instructor Material
[University Policy S12-7](#), http://www.sjsu.edu/senate/docs/S12-7.pdf, requires students to obtain instructor's permission to record the course and the following items to be included in the syllabus:

- "Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor's permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material."
  - It is suggested that the greensheet include the instructor's process for granting permission, whether in writing or orally and whether for the whole semester or on a class by class basis.
  - In classes where active participation of students or guests may be on the recording, permission of those students or guests should be obtained as well.
- "Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent."

Academic integrity
Your commitment, as a student, to learning is evidenced by your enrollment at San Jose State University. The [University Academic Integrity Policy S07-2](#) at http://www.sjsu.edu/senate/docs/S07-2.pdf requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The [Student Conduct and Ethical Development website](#) is available at http://www.sjsu.edu/studentconduct/.

Campus Policy in Compliance with the American Disabilities Act
If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. [Presidential Directive 97-03](#) at http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the [Accessible Education Center](#) (AEC) at http://www.sjsu.edu/aec to establish a record of their disability.

CS149 / Operating Systems, Spring 2022, Course Schedule

This schedule is subject to change. Any change will be communicated via Canvas with fair notice.

Course Schedule

Week	Date	Topics	Chapters
1	01/27	The Role of OS Resource Management	Chapter-1 Class Notes
2	02/01 02/03	User and Operating System Interfaces System Calls – Linux and shell programming	Chapter-2 Class Notes
3	02/08 02/10	Inter process Communication	Chapter-3 Class Notes
4	02/15 02/17	Process Scheduling Inter process Communication	Chapter-3 Class Notes
5	02/22 02/24	Threads and Concurrency Multithreading	Chapter 4 Chapter-4
6	03/01 03/03	Review Exam-1 (Using Lockdown Browser)	Chapter 1 to 4
7	03/08 03/10	CPU Scheduling Multi-process Scheduling	Chapter-5 Chapter-5
8	03/15 03/17	Race Conditions – Critical section problem Semaphores	Chapter-6 Class Note
9	03/22 03/24	Monitors – signal and wait Synchronization in Java	Chapter-6 Chapter-7
10	03/29 03/31	Spring Recess No Classes	
	04/05 04/07	Monitors – signal and wait Synchronization in Java	Chapter-7
11	04/12 04/14	Review Exam-2 (Using Lockdown Browser)	
12	04/19 04/21	Deadlock characterization Deadlock in Multithreaded Applications	Chapter-8 Chapter-8
13	04/26 04/28	Contiguous Memory Allocation Paging and TLB	Chapter-9 Chapter-9
14	05/03 05/05	Virtual Memory Virtual Memory	Chapter-10 Chapter-12
15	05/10 05/12	File System Review	All Chapters
16	05/23	Final Exam (Using Lockdown Browser)	7:15 – 9:30 AM All contents