

San José State University
College of Science/Computer Science Department
CS 149 & SE 149 – Operating Systems, Sec 1, Fall 2015

Course and Contact Information

Instructor:	Dr. Kong Li
Office Location:	ENG 183
Email:	kong.li@sjsu.edu (subject starts with CS149_L3SID or SE149_L3SID, where L3SID is the last three digits of your student ID)
Office Hours:	Mon 3:00PM – 4:15PM or by appointment
Class Days/Time:	Mon & Wed 4:30PM – 5:45PM (8/20/2015 - 12/8/2015)
Classroom:	Duncan Hall 351
Prerequisites:	CS 146 or SE 146 (with a grade of "C-" or better). Students who do not provide documentation of having satisfied the class prerequisite requirements by the second class meeting will be dropped from the class.

Course Web Page and MYSJSU Messaging

Copies of the course materials such as the syllabus, major assignment handouts, etc. may be found on the course shell available from the eLearning platform Canvas at: <http://sjsu.instructure.com>. **Submission of any assignment (homework, project, etc.) should be made at Canvas** as well. You are responsible for regularly (i.e. every couple of days) checking with the messaging system (email, discussions, announcements, news) through Canvas and through MySJSU. Students are encouraged to use the Canvas discussion boards for collaboration.

- [Canvas information](http://www.sjsu.edu/at/ec/canvas/index.html) at <http://www.sjsu.edu/at/ec/canvas/index.html>
- Student can register for workshops entitled “[Getting started with Canvas](http://www.sjsu.edu/at/ec/aboutus/ecampusevents/index.html)” at <http://www.sjsu.edu/at/ec/aboutus/ecampusevents/index.html>
- If you are having problems logging on, please [submit a ticket](https://isupport.sjsu.edu/ecampus) at <https://isupport.sjsu.edu/ecampus>
- [Canvas student resources](http://www.sjsu.edu/at/ec/canvas/student_resources/index.html) at http://www.sjsu.edu/at/ec/canvas/student_resources/index.html
- [View instructor’s comment](http://guides.instructure.com/m/4212/1/54359-how-do-i-view-instructor-comments) at <http://guides.instructure.com/m/4212/1/54359-how-do-i-view-instructor-comments>

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.

Catalog Course Description is available at <http://info.sjsu.edu/web-dbgen/catalog/courses/CS149.html>

Course Goals and Learning Outcomes

Course Goals

- To introduce students to the role of an operating system as a hardware resource manager, and where the OS fits into the software application layer

- To acquaint students with the need to perform memory management, and to explain to them the various memory management techniques and their tradeoffs
- To help students appreciate how the CPU itself is managed by the operating system
- To educate students about the computer deadlock problem, how deadlocks are not unique to the computer system, and attempted solutions to fix the deadlock problem
- To instruct students about processes, their creation, and the software race condition that can happen when multiple processes are run concurrently and perform IPC
- To ensure that students are familiar with the classic IPC problems and how to use semaphores in their software development process to avoid race conditions

Course Learning Outcomes (CLO)

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

- CLO 1 Understand the role that the operating system software plays in the management of the various hardware subsystems of the computer system.
- CLO 2 Understand locality of memory reference and how it is used to perform effective memory hierarchy management.
- CLO 3 Understand the various mapping, replacement, and dynamic allocation algorithms for cache and virtual memory management.
- CLO 4 Understand the alternative CPU scheduling schemes, their tradeoffs, and their applications to other queue processing situations.
- CLO 5 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.
- CLO 6 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.
- CLO 7 Understand the various issues associated with the operating system's role in performing I/O and file management.

BS in CS Program Outcomes (PO)

- (a) An ability to apply knowledge of computing and mathematics to solve problems
- (b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- (c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- (i) An ability to use current techniques, skills, and tools necessary for computing practice
- (j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices
- (k) An ability to apply design and development principles in the construction of software systems of varying complexity

Required Texts/Readings

Textbook

- A. Silberschatz, P. Galvin, and G. Gagne, *Operating System Concepts, 9/E*. Wiley, December 2012. ISBN-13: 9781118063330, ISBN-10: 1118063333.
<http://www.os-book.com/>
<http://www.wiley.com/WileyCDA/WileyTitle/productCd-EHEP002013.html>
http://discover.sjlibrary.org/iii/encore_sjsu/record/C__Rb4428826

Other Readings

- T. Anderson and M. Dahlin, *OPERATING SYSTEMS: Principles and Practice, 2/E*. Recursive Books, 2014. ISBN-13: 9780985673529, ISBN-10: 0985673524.
<http://www.recursivebooks.com>
- A. Tanenbaum and H. Bos, *Modern Operating Systems, 4/E*. Pearson, 2015. ISBN-13: 9780133591620, ISBN-10: 013359162X.
<http://www.pearsonhighered.com/educator/product/Modern-Operating-Systems-4E/9780133591620.page>

Additional reading material will be distributed to the class as appropriate.

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](http://www.sjsu.edu/senate/docs/S12-3.pdf) at <http://www.sjsu.edu/senate/docs/S12-3.pdf>.

Homework: Each homework is *individual*. See separate document for homework assignment.

Exam and quiz: Exam and quiz will be in the form of, but not limited to, short answer questions, design questions, programming questions, etc., and will be based on the individual assignments and course material.

NOTE that [University policy F69-24](http://www.sjsu.edu/senate/docs/F69-24.pdf) 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 Policy

Student Assessment

Homework Assignments and Quiz	30%
Midterm Exam	30%
Final Exam (comprehensive)	40%

- The instructor reserves the right to change the percentages.
- The final grade of this class is *solely* based on *your* performance in *this* class.
- *Failure to obtain 50% of homework grade will result in a failing grade in this class.*
- The exam dates are final.

Grading

Grade	Overall Score
A+	95-100
A	90-94
A-	85-89
B+	80-84
B	75-79
B-	70-74
C+	65-69
C	60-64
C-	55-59
D+	50-54
D	45-49
D-	40-44
F	0-39

Late Penalty

Based on the clock of Canvas, assignments submitted after the deadline carry 100% penalty.

Makeup Exam

NO makeup exams will be given unless (1) you are pre-approved by the instructor in advance, and (2) you have documented compelling reasons (e.g., written medical excuse from doctor).

If you have situations that are out of your control, you need to speak to the instructor as early as possible.

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](http://www.sjsu.edu/senate/docs/F13-1.pdf) at <http://www.sjsu.edu/senate/docs/F13-1.pdf> for more details.

Classroom Protocol

- Students are encouraged to ask questions in the class.
- Each student is required to engage in classroom activities, submit assignments and reports on time, *and* take exams and tests on time.
- **Web-browsing in class is not allowed. Cell Phones are to be turned off during lectures and tests. During exams if you receive a cell phone call or page it will be assumed that you have completed your exam and no further work will be allowed.**
- **Audio/video recording, or taking pictures are not allowed.**
- Exams will be closed book, closed notes.
- Student causing disruption in the class will be asked to leave the class.

Policy on Cheating

A student or students involved in a cheating incident involving any non-exam instrument (homework, report, or lab project) will receive an F on that instrument, and will be reported to the CS department and related office. Whether the report will carry a recommendation for disciplinary action will be left to the instructor’s judgment.

A student or students involved in a cheating incident on any quick test, the midterm exam or the final exam will receive an F in the course, and will be reported to the CS department and related office with a recommendation for disciplinary action.

More details in “Academic integrity” section. Also see <http://www.sjsu.edu/senate/docs/S07-2.pdf>.

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](http://www.sjsu.edu/senate/docs/S90-5.pdf) 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](http://info.sjsu.edu/web-dbgen/narr/catalog/rec-12234.12506.html), 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](http://info.sjsu.edu/static/catalog/policies.html) 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](http://www.sjsu.edu/provost/services/academic_calendars/) at http://www.sjsu.edu/provost/services/academic_calendars/. The [Late Drop Policy](http://www.sjsu.edu/aars/policies/latedrops/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](http://www.sjsu.edu/advising/) 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), <http://www.sjsu.edu/senate/docs/S12-7.pdf>, requires students to obtain instructor’s permission to record the course.

- “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](http://www.sjsu.edu/senate/docs/S07-2.pdf) 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](http://www.sjsu.edu/studentconduct/) 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](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) 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.

Accommodation to Students' Religious Holidays

San José State University shall provide accommodation on any graded class work or activities for students wishing to observe religious holidays when such observances require students to be absent from class. It is the responsibility of the student to inform the instructor, in writing, about such holidays before the add deadline at the start of each semester. If such holidays occur before the add deadline, the student must notify the instructor, in writing, at least three days before the date that he/she will be absent. It is the responsibility of the instructor to make every reasonable effort to honor the student request without penalty, and of the student to make up the work missed. See [University Policy S14-7](#) at <http://www.sjsu.edu/senate/docs/S14-7.pdf>.

Student Technology Resources

Computer labs for student use are available in the [Academic Success Center](#) at <http://www.sjsu.edu/at/asc/> located on the 1st floor of Clark Hall and in the Associated Students Lab on the 2nd floor of the Student Union. Additional computer labs may be available in your department/college. Computers are also available in the Martin Luther King Library. A wide variety of audio-visual equipment is available for student checkout from Media Services located in IRC 112. These items include DV and HD digital camcorders; digital still cameras; video, slide and overhead projectors; DVD, CD, and audiotape players; sound systems, wireless microphones, projection screens and monitors.

SJSU Peer Connections

Peer Connections, a campus-wide resource for mentoring and tutoring, strives to inspire students to develop their potential as independent learners while they learn to successfully navigate through their university experience. You are encouraged to take advantage of their services which include course-content based tutoring, enhanced study and time management skills, more effective critical thinking strategies, decision making and problem-solving abilities, and campus resource referrals.

In addition to offering small group, individual, and drop-in tutoring for a number of undergraduate courses, consultation with mentors is available on a drop-in or by appointment basis. Workshops are offered on a wide variety of topics including preparing for the Writing Skills Test (WST), improving your learning and memory, alleviating procrastination, surviving your first semester at SJSU, and other related topics. A computer lab and study space are also available for student use in Room 600 of Student Services Center (SSC).

Peer Connections is located in three locations: SSC, Room 600 (10th Street Garage on the corner of 10th and San Fernando Street), at the 1st floor entrance of Clark Hall, and in the Living Learning Center (LLC) in Campus Village Housing Building B. Visit [Peer Connections website](http://peerconnections.sjsu.edu) at <http://peerconnections.sjsu.edu> for more information.

SJSU Writing Center

The SJSU Writing Center is located in Clark Hall, Suite 126. All Writing Specialists have gone through a rigorous hiring process, and they are well trained to assist all students at all levels within all disciplines to become better writers. In addition to one-on-one tutoring services, the Writing Center also offers workshops

every semester on a variety of writing topics. To make an appointment or to refer to the numerous online resources offered through the Writing Center, visit the [Writing Center website](http://www.sjsu.edu/writingcenter) at <http://www.sjsu.edu/writingcenter>. For additional resources and updated information, follow the Writing Center on Twitter and become a fan of the SJSU Writing Center on Facebook. (Note: You need to have a QR Reader to



scan this code.)

SJSU Counseling Services

The SJSU Counseling Services is located on the corner of 7th Street and San Fernando Street, in Room 201, Administration Building. Professional psychologists, social workers, and counselors are available to provide consultations on issues of student mental health, campus climate or psychological and academic issues on an individual, couple, or group basis. To schedule an appointment or learn more information, visit [Counseling Services website](http://www.sjsu.edu/counseling) at <http://www.sjsu.edu/counseling>.

CS 149 & SE 149 Operating Systems Fall 2015 Course Schedule

The schedule is tentative and subject to change with fair notice. *The final exam date is firm and cannot be changed.* Any changes will be announced in due time in class and on the course's web site. The students are obliged to consult the most updated and detailed version of the reading material and syllabus, which will be posted on the course's web site.

Course Schedule

Week	Date	Topics	Textbook
1	8/24	Course Logistics & Linux/VM Environment	
1	8/26	Introduction Prerequisite due	1
2	8/31	OS Structure	2
2	9/2	OS Structure (cont'd)	2
3	9/7	(no class – Labor Day)	
3	9/9	Processes	3
4	9/14	Processes (cont'd)	3
4	9/16	Processes (cont'd)	3
5	9/21	Threads	4
5	9/23	Threads (cont'd)	4
6	9/28	Synchronization. HW1	5
6	9/30	Synchronization (cont'd)	5
7	10/5	Synchronization (cont'd)	5
7	10/7	Scheduling. HW2	6
8	10/12	Scheduling (cont'd)	6
8	10/14	HW1 & HW2 Discussion, Review	
9	10/19	MIDTERM EXAM (close book, close notes)	1 - 5
9	10/21	Deadlocks	7
10	10/26	Deadlocks (cont'd)	7
10	10/28	Deadlocks (cont'd)	7
11	11/2	Memory	8

Week	Date	Topics	Textbook
11	11/4	Memory (cont'd). HW3	8
12	11/9	HW3 & Midterm Discussion	
12	11/11	(no class – Veteran's Day)	
13	11/16	Virtual Memory	9
13	11/18	Virtual Memory (cont'd)	9
14	11/23	Mass storage	10
14	11/25	Mass storage (cont'd)	10
15	11/30	Virtual Machine	16
15	12/2	Virtual Machine (cont'd)	16
16	12/7	Review	
16	12/9	(no class – Last day of instruction 12/8)	
	12/10	<u>FINAL EXAM Thu, Dec 10, 14:45 – 17:00 (close book, close notes)</u>	All

http://www.sjsu.edu/hr/docs/payroll/info/holiday_calendar_2015.pdf

<http://info.sjsu.edu/static/catalog/final-exam-schedule-fall.html>