

San José State University
Department of Computer Science
CS 149 – Operating Systems, Section 1 - Fall 2018

Course and Contact Information

Instructor: Ahmed Ezzat
Office Location: MH-218 (only by advanced reservation)
Email: Ahmed.Ezzat@sjsu.edu
Office Hours: Tu + Th 10:00AM – 11:00am (only by advanced reservation)
Class Hours: Tu + Th: 6:00PM – 7:15PM
Classroom: **Duncan Hall-135**
Prerequisites: CS 146 (Data Structures and Algorithms) *or* SE-146 with a grade of C- or better, or instructor's consent. The Department of Computer Science strictly enforces prerequisites. The instructor may drop any student who does not show up for the first two class meetings without providing a valid excuse ahead of time.
Grader: Shivanku Mahna **Email:** shivanku.mahna@sjsu.edu

Course Description

Operating Systems: Fundamentals: Contiguous and non-contiguous memory management; processor scheduling (process and thread) and interrupts, synchronization (concurrent, mutually exclusive), deadlocked processes, file system, Input/Output, security, and networking. In addition, the course at the end covers case studies to review how specific operating systems handled the above subsystems that we covered earlier. Substantial programming project required. 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

Course Learning Outcomes (CLO)

Upon successful course completion, students would achieve the following:

- 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 paging and page replacement algorithms
- Understand the alternative CPU scheduling schemes, their tradeoffs, and their applications to other queue processing situations

- Understand synchronization and how a program can use to ensure data integrity
- Understand CPU scheduling including preemptive vs. non-preemptive scheduling
- 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

- **No traditional textbook purchase is required for this course. Excellent course readings will be adapted from online readings available through [OER Commons](#).**
- **In addition, all class presentations are available on Canvas through links in the Course Schedule below.**
- **Couple of advanced topics not covered in the [OER Commons](#) are made available as Operating Systems Supplement. This supplement covers: Multiple Process Systems, Input/Output, Virtualization and the Cloud, OS Case Studies, and OS Problems survey. This OS supplement by Dr. A. Ezzat is available through our local publisher: Maple Press*.**

Course Requirements and Assignments

All the assignments and related documents must be handed in the classroom on due date. Students will lose 10% of the homework or project grade for each day delay, and after 5 days, homework/projects will not be accepted.

Groups are created for Project assignments. Student can elect to implement projects on their own or become member of a group; the choice need to be coordinated with the professor. Project-1 is an individual project independent of the student electing to be member of group or not. All Projects' descriptions are available on Canvas.

- Project-1: [Assignment is on Aug. 28, 2018, and is due back on Sept. 6, 2018.](#)
- Project-2: [Assignment is on Sept. 11, 2018, and is due back on Sept. 20, 2018.](#)
- Project-3: [Assignment is on Sept. 20, 2018, and is due back on Oct. 9, 2018.](#)
- Project-4: [Assignment is on Oct. 9, 2018, and is due back on Oct. 25, 2018.](#)
- Project-5: [Assignment is on Oct. 25, 2018, and is due back on Nov. 13, 2018.](#)
- Project-6: [Assignment is on Nov. 13, 2018, and is due back on Nov. 29, 2018.](#)

Midterm and Final Exams

The midterm and final examinations will be closed book and no notes. There will be no laptops, or any personal digital devices allowed. There will be no make-up exams. If a

student misses an exam without a legitimate excuse, a grade of zero will be recorded. If a student missed an exam with a legitimate excuse then the grade for that exam will be prorated. More details can be found on final examination in [University Policy S06-4](http://www.sjsu.edu/senate/docs/S06-4.pdf) (<http://www.sjsu.edu/senate/docs/S06-4.pdf>) which states that “There shall be an appropriate final examination or evaluation at the scheduled time in every course, unless specifically exempted by the college dean who has curricular responsibility for the course.”

Grading Information

Your individual class grade will be weighted as follows:

- | | | | |
|---------------------------|-----|-----------|-------------------------|
| • Projects | 45% | 45 points | individual/group scores |
| • Quizzes / Participation | 5% | 5 points | individual scores |
| • Midterm | 25% | 25 points | individual scores |
| • Final exam | 25% | 25 points | individual scores |

Each assignment/project, and exam will be scored (given points) but not assigned a letter grade. The mean score will be announced after each exam.

Determination of Grades

Final individual class letter grades will be assigned based on the class desire to adopt absolute or relative grading; this will be finalized early in the class. Individual project grade is divided into 50% based on the demo is working and quality of code, and the other 50% is based on individual answers to grader’s project related-questions.

Classroom Protocol

It is expected that student attend classes, be active and participate in the class by asking/answering questions, arrive in time and leave only after the class is ended. No eating is allowed in the classroom, and it is expected to turn your cell off before entering the classroom.

University Policies

General Expectations, Rights and Responsibilities of the Student

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs’ [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>

CS 149, Operating Systems, Course Schedule

Any changes in the schedule will be sent to registered students through their SJSU email address 1 week earlier.

Operating Systems, CS 149, Section 1, Fall 2018

* Maple Press: 330 S 10th Street, #200, San Jose, CA 95112
Tel: 408-297-1000

The core class material is adopted from the SJSU OER; please visit the site: [OER Commons CS 401: Operating System](#). The “OS Supplemental material including OS problems survey” are available through Maple Press*. Projects are posted on Canvas.

Week	Date	Item
1	Aug. 21 st	Lecture: Introduction to Operating Systems
1	Aug. 23 rd	Lecture: Introduction to Operating Systems
2	Aug. 28 th	Lecture: Processes and Threads + P1 / P1-Preview
2	Aug. 30 th	Lecture: Processes and Threads
3	Sept. 4 th	Lecture: Synchronization
3	Sept. 6 th	Lecture: Synchronization + CPU Scheduling + Return P1
4	Sept. 11 th	Lecture: CPU Scheduling + P2 / P2-Preview
4	Sept. 13 th	Lecture: Deadlock
5	Sept. 18 th	Lecture: Deadlock
5	Sept. 20 th	Lecture: Memory Management + P3 / P3-Preview + Return P2
6	Sept. 25 th	Lecture: Memory Management
6	Sept. 27 th	Lecture: Memory Management
7	Oct. 2 nd	Lecture: File System + Midterm Review
7	Oct. 4 th	Lecture: File System
8	Oct. 9 th	Lecture: File System + P4 / P4-Preview + Return P3
8	Oct. 11 th	Midterm (Closed book)
9	Oct. 16 th	Lecture: Input/Output
9	Oct. 18 th	Lecture: Input/Output
10	Oct. 23 rd	Lecture: Security
10	Oct. 25 th	Lecture: Security + P5 / P5-Preview + Return P4
11	Oct. 30 th	Lecture: Network Architecture and Network Protocols
11	Nov. 1 st	Lecture: Network Architecture and Network Protocols
12	Nov. 6 th	Lecture: Multi-Processor Systems
12	Nov. 8 th	Lecture: Multi-Processor Systems
13	Nov. 13 th	Lecture: Virtualization and the Cloud + P6 / P6-Preview + Return P5
13	Nov. 15 th	Lecture: Case Study 1: Linux and Android
14	Nov. 20 th	Lecture: Case Study 1: Linux and Android
14	Nov. 22 nd	Thanksgiving Holiday
15	Nov. 27 th	Lecture: Case Study 2: Windows 8
15	Nov. 29 th	Lecture: Case Study 2: Windows 8 + Return P6
16	Dec. 4 th	Lecture: Operating System Design
16	Dec. 6 th	Lecture: Class Review + Final Review
17	Dec. 11 th	No Class (School is off)
17	Dec. 13 th	Final (Closed book) – DH-135 , Time is in this period: 5:30pm – 7:00pm