CSC139 Operating System Principles

Fall 2019, Part 1-1

Instructor: Dr. Yuan Cheng

Session Plan

- Administrative Overview

Instructor

- Yuan Cheng
  - Office: RVR 5042
  - Email: yuan.cheng@csus.edu
  - Tel: (916) 278-6088
  - Web: http://www.ycheng.org
  - Office hours: Mon & Wed 2:30 pm – 3:30 pm, Fri 11 am – 12 pm, or by appointment

Description

- 3 units
- Lectures from Aug 26th to Dec 4th
  - Section 1: M/W 4 pm – 5:15 pm at RVR 1008
- We will discuss 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.

Prerequisites

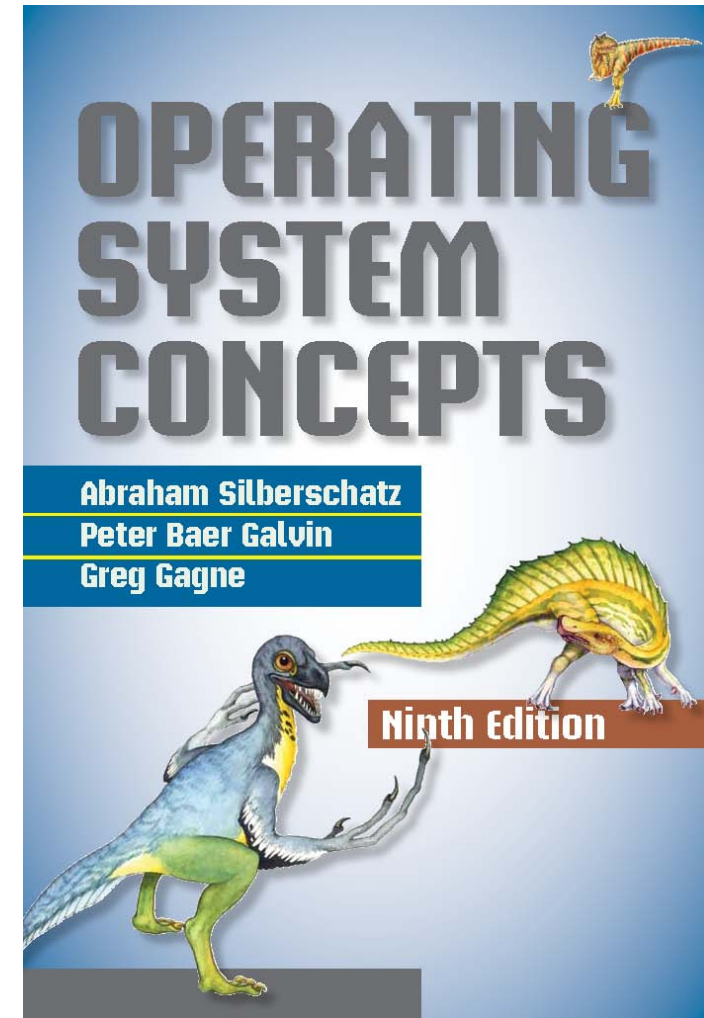- CSC 60, CSC 130 and either CSC 137 or CpE 185.

Textbook

- A. Silberschatz, P. Galvin, and G. Gagne, Operating System Concepts, 10th edition, Wiley, 2018. ISBN: 978-1119320913
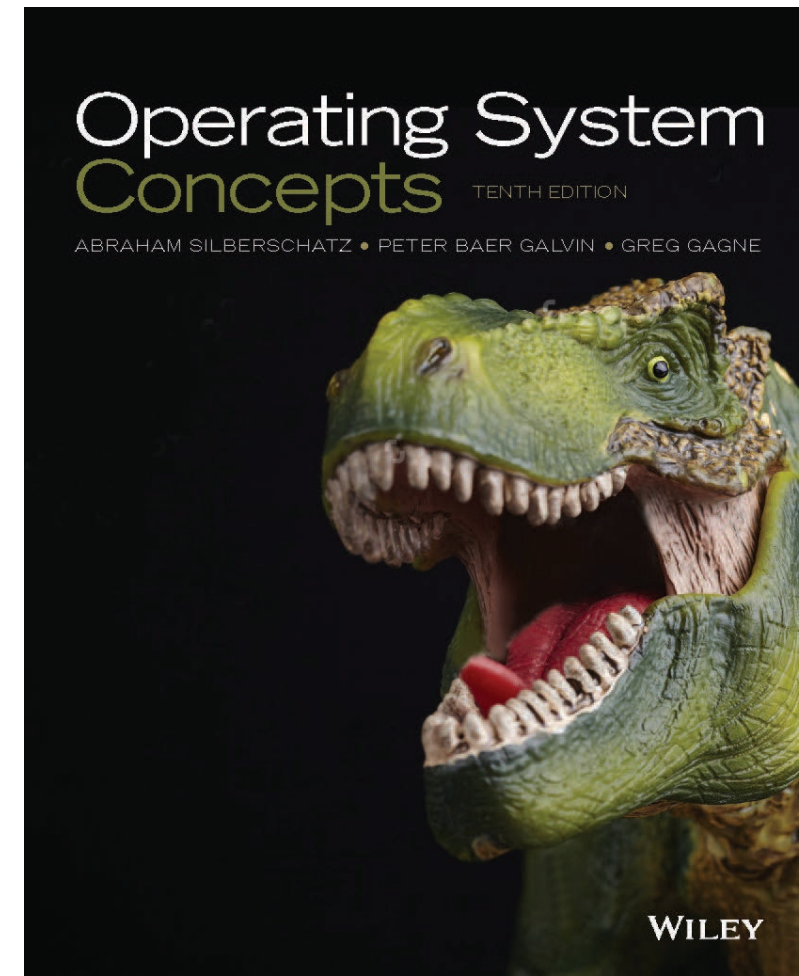
Alternative Textbook

- A. Silberschatz, G. Gagne and P. Galvin, Operating System Concepts, 9th edition, Wiley, 2013. ISBN: 978-1118129388

Resources

- Canvas (for announcements, slides, assignments, and grades, etc.)
  - Take advantage of the Discussions feature
- Book site: http://os-book.com/OS10/index.html

Course Outcomes

- Students completing this course will be able to
  - 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.
  - Apply appropriate methods in handling deadlocks and starvations.
  - Grasp issues, principles, performance criteria, and pros/cons of various algorithms and methods in different types of computer resource management.
  - 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.
  - Understand security issues of operating systems and how to design around them.
  - Fully explain how processes and its memory is managed in an operating system.
  - Demonstrate knowledge in virtualization of computing hardware.
  - Provide detailed information about file systems in modern computers.

Student Outcomes

- This course contributes to the following student outcomes. Students should be able to
  - 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;
  - Analyze a problem, specify the requirements, design, implement, and evaluate a computer- based system, process, component, or program that satisfies the requirements;
  - Use current skills, techniques, and tools necessary for computing practice;
  - Understand professional, ethical, and security issues and responsibilities.

Tentative Topics

- Processes and threads.
- Race condition, the critical section problem and its solutions.
- Deadlock and starvation.
- Processor scheduling and real-time scheduling.
- Memory management and virtual memory.
- File system, disk scheduling and RAID.
- I/O systems.
- Network and distributed operating systems.
- Protection and security.

Grading

- Midterms: 30% (15% × 2)
- Final Exam: 20%
- Programming Assignments: 30%
- Homework Assignments: 10%
- Quizzes: 6%
- Attendance: 4%

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

Historical Data

Section	Median	Average	Highest	Stdev	D/F/W Rate
F18 Sec 3	66.33	66.33	92.69	17.21	7/38
F18 Sec 4	67.58	67.59	86.88	12.55	3/39
S19 Sec 2	75.40	73.19	85.40	8.90	2/32
S19 Sec 4	74.92	75.51	90.06	8.55	4/39
S19 Sec 6	74.80	72.55	94.02	14.20	5/38
S19 Sec 7	73.25	73.53	89.68	9.16	5/36

The Survival Rule

$$\mathcal{B} > \frac{1}{N} \sum_{i=1}^{N} x_i$$

Be greater than average!

Attendance, Assignments, and Exams

- Attend Class
  - Attendance to class is expected. Class roll will not be checked after the first two weeks of classes unless the instructor deems it necessary. However, you are responsible for material presented and announcements made in class or by email. This could include changes to the syllabus, exam dates, etc.
- Complete Assignments
  - Work by yourself
  - Electronic submission
  - Submit on time (All assignments due at 11:59pm on the specified due date)
  - ***15% penalty per day***
  - ***No acceptance if more than 72 hours late***
  - ***5 grace days to spare***
- 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.

Drop and Incomplete Policies

- Drop policy
  - 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.

Accommodations

- 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/

Academic Honesty

- "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."

Expectations

- Attend class
  - Ask questions
  - Speak up in class
  - Engage during in-class exercises
- Read assigned text
  - Skim readings before lecture
  - Read in-depth later
  - Class/slides/notes are for high-level concepts
  - Reading & exercises are for low-level details
  - Exams rely on low-level details
- Start assignments early
  - "If you wait until the last minute, it takes only a minute to do." -- Cyril Northcote Parkinson
- Write well and clearly
- Get help when you need it

Next session

- We will discuss:
  - Introduction to Operating Systems
- Reading assignment: (skim through before class and continue reading over the weekend)
  - SGG: Ch. 1, Ch. 2