

Syllabus

COEN 283 Operating Systems Department of Computer Science and Engineering Santa Clara University

Dr. Ming-Hwa Wang Fall Quarter 2024
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Course website: <http://www.cse.scu.edu/~m1wang/os/>
Office Hours: Tuesday & Thursday 9:00-9:30pm, Saturday 11:00am-12:00pm

Course Description

Fundamentals of operating systems. Processes, Memory, I/O, and File Systems. Implementation and performance issues. Security, Multimedia Systems, Multiple-processor Systems.

Prerequisites

Abstract Data Types and Data Structures (COEN 12), Introduction to Embedded Systems (COEN 20) or equivalent.

Required Textbooks

1. "Modern Operating Systems, 5th Edition", by Andrew S. Tanenbaum, ISBN: 9780137618873, Prentice Hall, 2022

Recommended Textbooks

1. "Operating Systems: Principles and Practice, 2nd Edition" by Thomas Anderson and Michael Dahlin, ISBN: 978-0985673529, Recursive Books 2014
2. "Operating System Design: The Xinu Approach", by Douglas Corner, ISBN: 978-14398-81095, Chapman and Hall/CRC, 2011
3. "Operating Systems In Depth", by Thomas W. Doeppner, Wiley 2010
4. "Understanding Operating Systems, 6th Edition", by Ann McIver McHose, Ida M. Flynn, Course Technology 2010
5. "Operating System Concepts, 8th Edition", by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne, Wiley, 2008
6. "Operating Systems Design and Implementation, 3rd Edition", by Andrew S Tanenbaum, Albert S Woodhull, Prentice Hall, 2006
7. "Operating Systems, 3rd Edition", by Harvey M. Deitel, Paul J. Deitel, David R. Choffnes, Prentice Hall, 2003
8. "Survey of Operating Systems", by Charles Holcombe, Jane Holcombe, McGraw-Hill, 2002

References

1. "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", by Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, Morgan Kaufmann, 2012
2. "Guide to Reliable Distributed Systems: Building High-Assurance Applications and Cloud-Hosted Services", by Kenneth P. Birman, ISBN: 978-1447124153, Springer 2012
3. "Learning Android", by Marko Gargenta, O'Reilly, 2011
4. "Running Xen: A Hands-On Guide to the Art of Virtualization", by Jeanna N. Mathews, Eli M. Dow, Todd Deshane, Wenjin Hu, Jeremy Bongio, Patrick F. Wilbur, Brendan Johnson, Prentice Hall, 2008
5. "Linux Device Drivers, 3rd Edition", by Jonathan Corber, Alessandro Rubini, Greg Kroah-Hartman, ISBN: 978-0596005900, O'Reilly, 2005
6. "Understanding the Linux Kernel, 3rd Edition", by Daniel P. Bovet, Marco Cesati, ISBN: 978-0596005658, O'Reilly, 2005
7. "Virtual Machines: Versatile Platforms for Systems and Processes", by Jim Smith, Ravi Nair, ISBN: 978-1558609105, Morgan Kaufmann, 2005
8. "Real-Time Systems", by C.M. Krishna, Kang G. Shin, McGraw-Hill, 1997

Course Objectives

1. To learn advanced and cutting-edge state-of-the-art knowledge and implementation in operating systems.
2. To read and understand research publications in the technical area of operating systems, beyond that of the traditional textbook level.
3. To conduct group project and to equip for scholarly research in operating systems.

Expected Learning Outcomes

1. Demonstrate the knowledge of operating systems including process management and scheduling, concurrency control, synchronization, critical section, language constructs for concurrent programming, deadlock handling, memory management, file systems, I/O, multimedia, real-time and embedded systems, virtualization, queuing theory and performance techniques, parallel and distributed systems, etc.
2. Implement example thread program or concurrent program with process synchronization and deadlock avoidance.
3. Implement example program for memory management or file system.
4. Conduct group project and equip for academic research in operating systems.
5. Explore other advanced topics if time permits.

Grading Policy

Course grade is determined based on the total score (maximum 1300 points) from:

1. Mid-term and final exams of 200 points each (close book with one A4 note, no sitting together, no wireless connection.) Makeup exams (must have a very good reason) are much difficult than normal exams.
2. Two programming assignments of 200 points each (late penalty: 40 points/day.) Makeups are more difficult too. You can call Design Center at 408/554-4909 for setup account or IT support, and ssh linux.dc.engr.scu.edu to work remotely. You need upload your source files and Makefile to Camino and using Submit/Autotest for submission.
3. A group (2-3 people in a team) programming term project of 300 points (late penalty: 60 points/day.) No makeup is allowed.
4. Bonus assignments will be assigned at each week with 20 points each. Due the day before next lecture begins by uploading to Camino (in plain text or PDF). The solution for bonus assignments will be posted on my protected web page. Please read solutions of bonus assignments before asking questions. No late work accepted for bonus assignments. 75-80% of exam questions are similar to bonus assignments.
5. Class average targeted at **A-**.

Table 1: Grade-score table or triple 1/3 rule

1000	950	900	850	800	750	700	650	0
-	-	-	-	-	-	-	-	-
1300	999	949	899	849	799	749	699	649
A	A-	B+	B	B-	C+	C	C-	F

Course Schedule (Tuesday & Thursday 7:10pm-9:00pm)

Table 2: Course Schedule

#	Week	Readings	Remarks
1	9/24 9/26	introduction	submit due 9/25
2	10/1 10/3	Processes/threads	
3	10/8 10/10	memory manage	
4	10/15 10/17	file systems	program #1 due 10/13
5	10/22 10/24	input/output	mid-term exam 10/24
6	10/29 10/31	deadlocks	program #2 due 10/27 problem due 10/29 group & topic due 11/1
7	11/5 11/7	multimedia os	paper presentation 11/5 11/7 last day to withdraw 11/8
8	11/12 11/14	multi-processor	proposal due 11/12
9	11/19 11/21	distributed systems	
10	11/26 11/28	Thanksgiving	
11	12/3 12/5	security	final 12/5

12 12/10 review project defense 12/10

Reminder

- No cheating, and no register complaint without talking to me first.
- No incomplete. No sit-in or audit the class except formally registered.
- Read files under /home/mwang2/tips for help.
- Handouts, assignments, and solutions will be posted on the web. You should check the class web site at least once a week (and don't forget to refresh the webpage to get the latest versions). You are responsible for printing and bring the handout to the class if you prefer printed pages.
- Office hours: Tuesday & Thursday 9:00pm-9:30pm, Saturday 11:00am-12:00pm.

Honor Code

All students taking course in the school of engineering agree, individually and collectively, they will neither give nor receive unpermitted aid in examinations or other course work that is to be used by the instructor as a basis of grading.

Disability Accommodation Policy:

To request academic accommodations for a disability, students must contact Disability Resources located in The Drahnann Center in Benson, room 214, (408) 554-4111; TTY (408) 554-5445. Students must provide documentation of a disability to Disability Resources prior to receiving accommodations.