

CS 5323: Design and Implementation of Operating Systems II

Spring 2021 Syllabus

Instructor Information

Name: Sathyanarayanan Aakur
Office: MSCS 210 (Virtual)
Email: saakurn@okstate.edu
Office Hours: M W 1:00 - 2:30 pm, or by appointment.

Class Information

Dates: 20th Jan - 7th May
Time: MW 2:30 - 3:45 pm
Classroom: Online (Microsoft Teams/Canvas)

TA Information

Name: Rupali Firke
email: rupali.firke@okstate.edu
Office Hours: Thursdays 1:00 pm to 3:00 pm
Office: Virtual (Zoom link in Canvas)

Course Description

This course look into the important problems in operating system design and implementation. The operating system provides an established, convenient, and efficient interface between user programs and the bare hardware of the computer on which they run. The discussion will cover the trade-offs that can be made between performance and functionality during the design and implementation of an operating system. Particular emphasis will be given to three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), and file systems; and on operating system support for distributed systems. *Prerequisite:* CS 4323 or equivalent and Knowledge of programming

Online Lectures

Please note that lectures and discussions held in class may be recorded or videotaped and uploaded to Canvas. Only students enrolled in this class may access this content.

Course Objectives

After this course, you should be able to . . .

- Further understanding of the principles of operating systems.
- Develop insight into process management and scheduling issues.

- Understand memory management operation.
- Develop an understanding of file system implementation and of multiple levels of hardware support and management.
- Develop a deep understanding of the concepts of cooperating processes, including communication, synchronization, and deadlock(detection and avoidance).
- Be able to evaluate operating system features.
- Develop an understanding of the distributed operating system environment.

Textbook,& Software

No particular book is *required* for this course. However, I would recommend the following books for reference.

Textbook 1: *Operating Systems Concepts, Ninth Edition*, by Silberschatz, Galvin, and Gagne published by John Wiley and Sons.

Textbook 2: *Operating Systems: Three Easy Pieces*, by Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau. Available online: <http://pages.cs.wisc.edu/~remzi/OSTEP/>.

For the projects you may want a book on C programming. It is expected that students in this class have basic prior experience with operating systems either through programming or undergraduate instruction.

Course Outline and Tentative Schedule

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|---------|--|
| Week 1 | Course introduction |
| Week 2 | OS Structure, Process, Inter-process communication |
| Week 3 | Basics of Threads |
| Week 4 | CPU Scheduling |
| Week 5 | Critical Section, Process Synchronization, Semaphore |
| Week 6 | Classic Problem, Deadlocks |
| Week 7 | Deadlock, Memory Management, Midterm |
| Week 8 | Paging, Segmentation, Virtual Machine |
| Week 9 | Files, Mass Storage |
| Week 10 | Disk, I/O System |
| Week 11 | I/O Systems |
| Week 12 | Distributed Systems |
| Week 13 | File Systems |
| Week 14 | Protection, OS Systems and Networks |
| Week 15 | Pre Finals Week |
| Week 16 | Finals Week |

Class Attendance and Participation

Attendance is strongly encouraged, but not required. Students are responsible for any material covered in class. Some of the material covered in class will not be in the textbook. Announcements about tests etc. will be made in class and/or by email. Students are to check their emails regularly (using their class accounts).

Assignments and Quizzes

- If you need or desire an extension on any Assignment for any reason, contact your instructor in a timely fashion, as permitted by the need. There is no guarantee that you will receive an extension on any assignment, so plan your schedule carefully. **No late work is accepted!!**
- There will often be a weekly quiz. The quizzes will most often be given on Fridays, and sometimes Wednesdays. There will be a quiz for the topics covered in every week. Start preparing for quizzes before they arrive! *No make-up quizzes will be given.* Quizzes will be Open book and Open notes. It will be online on Canvas.
- Academic integrity is taken very seriously. You are permitted to discuss the course material with fellow students in general terms, but the programs you write must be your own. Code copied from each other or found on the web will result in an automatic zero for the assignment, and may even result in earning an “F!” for the course and facing academic disciplinary measures.

Exams

- There is an **Online midterm and a final exam** will be taken on **Canvas**. The midterm exam is scheduled for the week of February 21st. You are not permitted to use any outside materials, resources, on the exams. Any violation of this policy is a violation of the university's Academic Integrity Policy.
- The final exam is comprehensive and will be given during a two-hour block. The exact time will be announced later in the semester. The final exam will only be given at the announced time. *There will be no exceptions.* If a student has a conflict with another final exam, the student must contact their instructor at least two weeks in advance in order to have it resolved.
- *There will be no make-up exams, even in the case of an emergency.* A missed exam counts as a zero unless a valid excuse from a physician or the Dean's Office is presented to your instructor. With an acceptable written excuse, a missed exam score will be replaced with the percentage earned on the corresponding subsection of the final exam.

Grading

The course grade is determined by the following components:

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|--------------|-----|
| Midterm Exam | 25% |
| Assignment | 25% |
| Quizzes | 25% |
| Final Exam | 25% |

Final grades will be assigned according to the following scale,

| | |
|---------|---------|
| Grade A | 90-100% |
| Grade B | 80-89% |
| Grade C | 70-79% |
| Grade D | 60-69% |
| Grade F | 0-59% |

DEPARTMENT POLICIES

Drop and Add Policy: Students will be allowed to drop as long as the University permits them to do so. A grade of W or F will be determined on the basis of the points earned until that time.

Academic Dishonesty/misconduct: The Computer Science departmental policy for academic dishonesty and misconduct applies to this class. A student attempting to gain unfair advantage by keeping an examination paper longer than the time permitted is guilty of academic misconduct.

Computer Usage: The Computer Science departmental policy for computer usage applies to this class. Exceptions will be made for students whose companies permit use of company machines for academic work. Students taking advantage of the exception must have two-way email access.

Americans with disabilities act: The Computer Science departmental policy for students with disabilities applies to this class. Anyone who has a need for examinations by special arrangements should see the instructor as the earliest possible opportunity during scheduled office hours.

Examinations/Tests: No discussion of any kind (except with the instructor) is allowed. No access to any type of written material is allowed. Students who do not comply with the described collaboration policy will receive a grade of F in the course and reported as academic dishonesty.

Important Dates

- Midterm: Week of 21st Feb 2021
- Last day to drop a course with no grade: 26th Jan 2021
- Academic Withdrawal Deadline: 9th Apr 2021
- Final Exam: TBD

University Holidays

- MLK Day: 18th January 2021
- Wellness day: 3rd February 2021
- Wellness day: 4th March 2021
- Wellness day: 13th April 2021