Sonoma State University
Computer Science Department
CS450, Operating Systems, Fall 2020

Instructor Contact Information

Name: Mark Gondree
Office Location: Darwin 116H
Office Telephone Number: (707) 664-3854
Email: gondree@sonoma.edu
Office Hours: By appointment at http://gondree.cs.sonoma.edu/meet
Piazza is the preferred method of contact. Expect a response within 24 hours during M–F.
Note: This syllabus[1] is subject to change.

General Course Information

Class Days/Time:

- TuTh 10:00AM - 11:50AM (Section 001)
- TuTh 3:00PM - 4:50PM (Section 002)

Classroom: Online
Prerequisites: Grade of C- or better in CS 252 and CS 315, or consent of instructor.

Course Description

Lecture, 4 hours. This course covers the fundamental concepts of operating system design and implementation; the study of problems, goals, and methods of concurrent programming; and the fundamentals of systems programming. Topics include resource-management, process and thread scheduling algorithms, inter-process communication, I/O subsystems and device-drivers, memory management including virtual memory, segmentation, and page-replacement policies. These topics will be covered in theory and in practice through the study of the source-code of a working operating system.

Course Goals and Student Learning Objectives

Student Learning Outcomes (SLO)

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

- Discuss the objectives of modern operating systems, their organization into abstract and hierarchical layers, how they enable and manage computing resources to be used by applications, and threats against operating systems.
- Explain how concurrency and process isolation are achieved in an operating system, including the motivation for dual-mode operation, the role of interrupts, mechanisms implementing a system call, and ways to achieve atomicity.
- Employ systems-level programming to create programs that fork child processes, create threads, perform inter-process communication, use synchronization primitives, and control the lifecycle of processes.

[1] Note: This is a GoogleDoc at https://bit.ly/3fbqjyb. Any changes will be announced via the course LMS, usually preceded by class discussion

- Demonstrate how scheduling works to allocate resources to competing entities, and employ common strategies to achieve fairness, avoid starvation, and prevent deadlock.
- Explain the relationship between low-level resources and higher-level abstractions provided by the OS, especially in the context of virtual memory (paging, segmentation, caching) and the virtual file system (inodes, files, directories).

Required Texts/Readings

Textbook

The following online interactive textbook is used in the course: *ZyBooks Operating Systems*. Follow these instructions to subscribe:

1. Sign in or create an account at https://learn.zybooks.com
2. Enter zyBook code: **SONOMACS450GondreeFall2020**
3. Click Subscribe

A subscription is $58.Students may begin subscribing on Aug 04, 2020 and the cutoff to subscribe is Nov 27, 2020. Subscriptions will last until Dec 25, 2020.

Questions about refunds (if you drop the class) or discounts (if you have subscribed to this book in a prior semester) are outlined by the publisher at https://www.zybooks.com/faq/

Classroom Protocol

The LMS will be used to maintain grades, syllabus, schedules, assignments and class resources. The LMS always holds the most current and authoritative set of due dates, exam dates, assignment instructions and other course material. Course announcements will be done on the LMS (which also sends these to your sonoma.edu email address), so you must check your email at least once a day.

We will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates and myself. Rather than emailing me, I encourage you to post questions on Piazza so everyone benefits from my response. Piazza gives you the option of sending messages to me that are anonymous, too.

You are encouraged to use office hours with questions. For questions related to grading, please see me during office hours—before class, after class, and in class are not appropriate times for questions about grades.

Course Requirements

The class activities are divided into these types:

- **Reading Activities**: These are associated with our digital textbook (Zybooks), and due by the date posted in Zybooks. The textbook has embedded "Participation Activities" and "Challenge Activities." Generally, one or both of these are assigned to be completed.
- **Activities**: These are checkpoint activities associated with in-class topics and projects. These may be due in class or out of class. For example, we may do some in-class practice work with a worksheet, and some part of that could be assigned as a graded activity; or you may be asked to demonstrate some intemediate progress toward part of a project.

- **Projects**: Three (3) projects will be assigned. These require programming in C, some written work, and possibly some research work. Each project will have a rubric and instructions published with it.
- **Exams**: We have two (2) exams. Each is non-cumulative, although topics in class build on prior topics. They will cover material from lectures, activities and the textbook.

Course Schedule for CS 450 (Fall 2020)

A detailed description of readings, assignments and weekly course topics will be posted to the schedule on the course LMS. The LMS will show the most accurate due date for each assignment, the true pace of our readings, etc.

Below highlights a plan of topics covered and planned dates for significant graded items. The schedule is subject to change with fair notice via the LMS.

Week	Starts	Weekly Topic	Tu	Th	Project/Exam Schedule
Week 1	8/17/20	M1: Intro	⏯		M1 Reading
Week 2	8/24/20	M2: Concurrency	⏯		
Week 3	8/31/20	M2: Concurrency	⏯		M2 Reading; Form Teams
Week 4	9/07/20	M3: Processes	⏯		
Week 5	9/14/20	M3: Threads	⏯		
Week 6	9/21/20	M3: Lifecycle	⏯		M3 Reading
Week 7	9/28/20	M4: Scheduling	⏯		Team Proj-1 due
Week 8	10/05/20	M4: Scheduling	⏯		M4 Reading
Week 9	10/12/20	M5: Memory Mgmt	⏯	📘	Exam-1
Week 10	10/19/20	M5: Memory Mgmt	⏯		M5 Reading
Week 11	10/26/20	M6: Synchronization	⏯		
Week 12	11/02/20	M6: Synchronization	⏯		M6 Reading; Team Proj-2 due
Week 13	11/09/20	M7: VFS	⏯		
Week 14	11/16/20	M7: VFS	⏯		M7 Reading
Week 15	11/23/20	M8: Secondary Storage	⏯		
Week 16	11/30/20	Catch-up	⏯		M8 Reading; Team Proj-3 due
Finals Week	Tu 12/8 at 10:30am–12:30pm Tu 12/8 at 3:30pm–5:30pm		📘		Exam-2

Note:

- The "play button" icon (⏯) indicates a synchronous Zoom session.
- The "blue book" icon (📘) indicates a synchronous Zoom session used for an Exam
- Students who have scheduling conflicts impacting exam dates should contact the instructor at the beginning of the semester.

Grading Policy

Class attendance is expected and mandatory, although not specifically graded. Your overall course grade will be determined from graded items, weighted per below, rounded to the nearest integer.

Item	Percentage
Reading Activities	10%
Activities	20%
Projects (3)	45%
Exams (2)	25%

Grading Scale

All CS majors must take this course for a letter grade. The course letter grade will be determined using the below scale (after rounding).

100% – 94%	93% – 90%	89% – 87%	86% – 84%	83% – 80%	79% – 77%	76% – 74%	73% – 70%	69% – 67%	66% – 63%	62% – 60%	below 60%
A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

Up to 3% may be added to your final grade at the instructor's discretion for constructive participation in the class. Constructive participation includes in-class participation; asking good questions or providing helpful responses via course forums; etc. Regular attendance is necessary but not sufficient for this bonus. No other adjustments of borderline grades will be considered.

Late policies

Absent extenuating circumstances (illness, family emergency), late submissions of any type will not be accepted. In particular:

- The late penalty for graded materials with due dates is -3% per day, but not to exceed -50%. Materials will be accepted until the posted "Until" date.
- Exams can be taken late only in extenuating circumstances (illness, family emergency).

Student Athletes need to notify the instructor within the first two weeks of the semester about possible game conflicts with our class schedule (and as soon as possible about subsequent changes). Give your instructor a copy of your game calendar and weekly schedule to facilitate rescheduling.

Collaboration policy

Collaboration is a complex idea in the programming world, since professionals routinely work in teams sharing code; they also navigate a variety of complex intellectual property rules that sometimes encourages (and sometimes discourges) sharing code more generally. In our class, the

collaboration policies are more artificial than the real world since they are designed to support you, as a beginner learner, to grow towards mastery and independence.

Supportive collaboration

Generally. We encourage you to seek help from and provide support to your peers, but only in ways that do not steal learning opportunities from them or from yourself. I call this "supportive collaboration. It is not only allowed, it is encouraged.

Warning: The boundary between collaboration and plagarism is often unclear. Once you see someone's solution, it is hard to un-see. It is safer to collaborate without looking at each other's screens. Use drawings to communicate ideas. Use references to past labs and class resources to establish common ground ("I just modified everything after line 40 in the textbook solution to 9.4, and that really helped me as a guide"). Help identify tools that are useful ("I found using a while loop was helpful") without sharing code. If you just share your screen and show someone how you did it, you are robbing them of a learning opportunity.

In particular. You are responsible not just for understanding every line of code you write, but also for knowing what would happen if your code was modified in some way or how to modify it to accomplish some nearby task.

Graded work collaboration policy

There is no collaboration of any form allowed on exams or quizzes, unless explicitly directed. Generally, graded work is to be completed by the individual student unless otherwise specified and following the university's policies on academic integrity. This includes making use of old exams or sample quizzes not provided by the instructor for student use.

Group work collaboration policy

When collaboration is required for group work, the group's work must be the sole effort of that group's members. Outside of group work, you may discuss ideas and approaches with other students and the course staff, but you should work out all details and write-up all solutions on your own. The following actions will be penalized as academic dishonesty:

- Copying part or all of another group's assignments
- Copying old or published solutions
- Looking at another group's work or discussing another group's work in great detail. You will be penalized if your solution matches another group's solution too closely.
- Sharing your group's work or describing your work in great detail to anyone other than your group members or the instructor.

Academic Dishonesty

Academic dishonesty will be severely penalized; at a minimum, you will receive a grade of 0 on the assignment. For more information, see SSU's cheating and plagiarism policy and the Dispute Resolution Board website.

Regrade request policy

Regrade requests will be accepted up to 1 week after a graded item is returned. The reason for the regrade request must be explained in email, with a copy of the assignment to be re-graded, to

the instructor's university email. Note that all regrade requests, except for those pointing out mistakes in the totaling of points, will cause the entire assignment to be regraded. The adjusted grade may therefore be higher or lower than the initial grade.

Incomplete grade policy

It is the policy of the Computer Science Department that a grade of Incomplete (I) shall be assigned only when the instructor concludes that a clearly identifiable portion of course requirements cannot be met within the academic term for unforeseen, but fully justified, reasons; and when there is still a possibility of earning credit.

An incomplete shall *not* be assigned when:

- The request is made before the thirteenth week of instruction
- It is necessary for the student to attend a major portion of the class when it is next offered (i.e., if a student needs to repeat a class, an incomplete should not be given)
- The student is not passing the course with a C- or better at the time of the request
- The student is unable to keep up with course work due to an excessive course load.

The condition for removal of the Incomplete shall be entered on the "Request for Incomplete" form and a copy filed in the department office prior to listing an "I" on the Grade Roster. The student must retain the grades for any coursework that was due prior to the incomplete being assigned. The incomplete cannot be removed on the basis of work taken at another institution nor by re-enrolling in the course.

An incomplete must be made up within one calendar year immediately following the end of the term in which it was assigned. This limitation prevails whether or not the student maintains continuous enrollment. Failure to complete the assigned work will result in an incomplete "I" being converted to a "NC" which will affect the grade point average.

Faculty-initiated drop in the first two weeks

If you do not indicate your commitment to taking this course in the first two weeks, you may be administratively dropped from the class. In this course, your commitment is evidenced by:

- Completing the "Start Here" module by the end of the first week of class
- Otherwise communicating with the instructor to explain your lack of progress, before the end of the second week of class.

Interruptions (power outages, fires, etc)

You might have outages. I might have outages. The school might have an outage (and we can't use blue). We both have duties here: you can try to not leave things for the last minute; I can try to be flexible, and we can be kind and understanding with each other. Here are some guidelines:

- If I am 10+ minutes late for class, I might be experiencing an outage. Check Piazza: if there isn't a note, ask for a status update. If I am 20+ minutes late, assume class is cancelled and expect a video to replace that material.
- If you can't get online to attend a session or experience an outage during class: don't worry, there will be a recording; watch it when you are able.
- Whenever there is any outage affecting infrastructures used by class for more than 48 hours, or for the 24-hour period before the due date, I will be adjusting lab due dates.

This means: prolonged blue.cs.sonoma.edu outages and canvas outages will all require adjustments.

Be aware: all my due dates already have some flex in them. If you face disruptions impacting you less than 48 hours: in most cases, you can recover from that without asking for adjusted due dates. That said, you are the best judge re: your own schedule — tell me as soon as possible if you are impacted and believe there needs to be adjustments.

Course LMS: Canvas

Canvas is SSU's Learning Management System (LMS). Canvas is the place where you will find the course syllabus, read posted announcements, participate in online class discussions with classmates, submit your assignments online and view the materials for this course. To access the Canvas course use your SSU Seawolf ID and password to log into SSU's Online Services portal. Click on the **Canvas** link. When you get to the Canvas Dashboard, click on the course title you would like to access.

Visit the SSU Canvas Support Center to review frequently asked questions about using Canvas and also to view a list of technical recommendations.

Canvas and General IT Help Desk

Contact Information Technology (IT) if you need assistance accessing Canvas or other information about computing and information technology at SSU. Three ways to contact the IT Help Desk are:

- Call: 707-664-4357
- Email: helpdesk@sonoma.edu
- Visit Location: Schulz 1000

General Student Computing

Review the information posted at IT Get Started, Students. There you will find computer use guidelines and a list of available computer labs.

Plugins

Download plugins that may be needed to access some content on or linked from SSU websites and Canvas. (If applicable, list any other plugins that may be needed to access/use publisher materials).

Canvas Help

- Getting Started with Canvas
- Student FAQs
- Canvas Student Overview Video
- How to Get Started with Canvas (Students)
- Canvas Community Student Video Guides
- Canvas Student Written Guides

Canvas Community

Visit the Canvas Community to view written Instructor Guides, written Student Guides, and/or Video Guides.

Library Research Guides and Subject Librarians

The University Library can help you find information and conduct research. You can make an appointment with a subject librarian, get help online, or drop by the library during open Research Help Hours. Additional relevant library resources include the Computer Science Subject Librarian and Information for Distance Learners.

University Policies

There are important University policies that you should be aware of, such as the add/drop policy; cheating and plagiarism policy, grade appeal procedures; accommodations for students with disabilities and the diversity vision statement. See Important Policies and Procedures for Students.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc. How to Add a Class has step-by-step instructions has step-by-step instructions. Registration Information lists important deadlines and penalties for adding and dropping classes.

Campus Policy on Disability Access for Students

If you are a student with a disability, and think you may need academic accommodations, please contact Disability Services for Students (DSS), Voice: (707) 664-2677, TTY/TDD: (707) 664-2958, as early as possible in order to avoid a delay in receiving accommodation services. Use of DSS services, including testing accommodations, requires prior authorization by DSS in compliance with university policies and procedures. See SSU's policy on Disability Access for Students.

Emergency Evacuation

If you are a student with a disability and you think you may require assistance evacuating a building in the event of a disaster, you should inform your instructor about the type of assistance you may require. You and your instructor should discuss your specific needs and the type of precautions that should be made in advance of such an event (i.e. assigning a buddy to guide you down the stairway). We encourage you to take advantage of these preventative measures as soon as possible and contact the Disability Services for Students office if other classroom accommodations are needed.

Academic Integrity

Students should be familiar with the University's Cheating and Plagiarism Policy. Your own commitment to learning, as evidenced by your enrollment at Sonoma State University and the University's policy, require you to be honest in all your academic coursework. Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified.

Other Policies

Children in class

Currently, the university does not have a formal policy on children in the classroom. The policy described here is just a reflection of my own beliefs and commitments to students, staff and faculty parents.

1. All exclusively breastfeeding babies are welcome in class as often as necessary;

2. For older children and babies, I understand that unforeseen disruptions in childcare often put parents in the position of having to miss class to stay home with a child. While it is not meant to be a long-term childcare solution, occasionally bringing a child to class in order to cover gaps in care is perfectly acceptable;
3. I ask that all students work with me to create a welcoming environment that is respectful of all forms of diversity, including diversity in parenting status;
4. In all cases where babies and children come to class, I ask that you sit close to the door to that if your little one needs special attention and is disrupting learning for other students you may step outside until their needs have been met.

Finally, I understand the often the largest barrier to completing your coursework once you become a parent is the tiredness many parents feel in the evening once children have finally gone to sleep. While I maintain the same high expectations for all students in my classes regardless of parenting status, I am willing to problem-solve with you in ways that make you feel supported as you strive for school-parenting balance.

Additional Resources

SSU Writing Center

The SSU Learning and Academic Resource Center (LARK), located at Schulz 1103, helps SSU students become better writers and produce better written documents. The knowledgeable and friendly tutors can help you with a wide array of concerns, from generating good ideas and organizing papers more clearly to learning citation formats and using semi-colons correctly. Visit the Learning and Academic Resource Center (LARK) homepage for more information on how to schedule time with a Writing Center tutor.

Counseling and Psychological Services (CAPS)

CAPS is a unit of the division of Student Affairs of Sonoma State University. CAPS offers confidential counseling to students experiencing personal problems that interfere with their academic progress, career or well-being. The CAPS website provides information only. If you would like to talk with someone or make an appointment, please call (707) 664-2153 between 8 a.m. – 5:00 p.m., Monday – Friday during the academic year.