



CS 492: Operating Systems

Department of Computer Science
Spring 2023

Instructor: Philippe Meunier

Canvas Course Address: <https://sit.instructure.com/courses/64275>

Course Schedule: MWF, section A: 9:00am B102, section B: 10:00am B102, section C: 11:00am H102, section D: 1:00pm E330

Contact Info: pmeunier@stevens.edu

Office Hours: I'm in my office in Gateway South 247 whenever I'm not teaching this course or having lunch / dinner. Feel free to stop by whenever you like.

Course Assistants:

Chandana Chebrolu <cchebrol@stevens.edu>

Sebastian Churion <schurion@stevens.edu>

Siddharth Suhas Dalvi <sdalvi3@stevens.edu>

Robert Feliciano <rfelici1@stevens.edu>

Siddharth Jain <sjain70@stevens.edu>

William Kastell <wkastell@stevens.edu>

Mohammad Khan <mkhan13@stevens.edu>

Vaishnavi Ajay Nayak <vnayak2@stevens.edu>

Yuchen Zhang <yzhan219@stevens.edu>

Ning Zhao <nzhao7@stevens.edu>

Prerequisite(s): CS 382, CS 385

COURSE DESCRIPTION

The use and internals of modern operating systems. Lectures focus on internals whereas programming assignments focus on use of the operating system interface. Major topics include: the process concept; concurrency and how to program with threads; memory management techniques, covering virtual memory and shared libraries; file system data structures; and I/O.

STUDENT LEARNING OUTCOMES

I am able to explain how preemptively scheduled processes and threads provide an abstraction that a program is the only one executing.
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I am able to explain how virtual memory provides an abstraction of physical memory.

I am able to explain how an operating system's input/output architecture provides an abstraction that every data source or sink behaves identically.
I am able to explain how the data structures of the UNIX file system serve to map file names to blocks of a storage device.
I am able to explain in detail how a system call is made and returns.
I am able to write a multi-threaded C program that uses at least one classical synchronization mechanism to solve at least one classical synchronization problem.

COURSE FORMAT AND STRUCTURE

This course is on campus. To access the course, please visit stevens.edu/canvas. For more information about course access or support, contact the TRAC by calling 201-380-6599 or 201-216-5500.

Course Logistics

- You, your instructor, and the course assistants are bound by the Stevens Honor System. Students are responsible for reading and understanding the course policies in this syllabus, in announcements made in class, and in announcements made on Canvas and / or through email.
- Since this course involves computer programming, while the vast majority of your work should be original, if at any point you use part of someone else's solution you **MUST** cite the source of the code. Copying from others (online or classmates) results in an automatic zero for the assignment and additional possible penalties (including course failure and / or escalation to the honor board).
- Except when groups are explicitly allowed, work must be done individually. You are encouraged to discuss the problems with your classmates but you must not share details of the solutions. If you are unsure whether you have shared too much, discuss the situation with the instructor; it is your obligation to avoid even the appearance of cheating. We will use Moss (<https://theory.stanford.edu/~aiken/moss/>) on assignments to verify your code is not too similar to that of other students in the class. If the system indicates a high likelihood of cheating, we will treat it as a violation of the Stevens Honor System.
- Assignments submitted on Canvas will be accepted late, but there is a 2% penalty for each hour past the deadline (counted at the start of the hour).
- If you accidentally submit the wrong assignment or an empty assignment, you can re-submit later but you will have the usual late penalty described just above.
- After grades are posted, you will have 3 days to inform your grader of a problem. You should also CC your instructor on the email. Do not try to request a grade change after three days, as you should learn from your mistakes in a timely fashion.
- During exams, you are not permitted to use notes, books, or computing or communication devices unless a different policy is specifically announced by the instructor.
- There are no make-ups for exams. Talk to your instructor if you foresee a problem.
- During lecture please refrain from using mobile phones.
- Attendance is mandatory. In particular I will manually check attendance for all quizzes and exams.
- Final letter grades will be scaled according to class-wide grade clustering.
- You are more than welcome to ask me questions as often as you want, by email or in person, and I will always be happy to help. The amount of help provided will be directly

proportional to the amount of time left before the deadline. Please don't wait until one hour before an assignment is due to send me a message; it'll be too late for me to provide help and too late for you to truly learn the material.

- Please do not ask me at the end of the semester to find creative ways to increase your grade. If you suspect that you are not doing well, come see me to rectify the situation as quickly as possible so that you will have a good grade at the end of the semester.

COURSE REQUIREMENTS

Canvas quizzes: several quizzes will be given, covering all course materials, to be completed online over canvas. Quizzes will be scheduled in advance.

Individual assignments: students will need to complete several individual assignments that should be completed in one or two weeks.

Group project: a software-development project will be given towards the end of the semester to be completed in a team.

COURSE MATERIALS

- Modern Operating Systems (4th Edition), Andrew S. Tanenbaum, Herbert Bos
- Linux Device Drivers (3rd Edition), Jonathan Corbet, Alessandro Rubini, and Greg Kroah-Hartman, <https://lwn.net/Kernel/LDD3/>
- Materials posted on Canvas

Optional

- Understanding the Linux Kernel, any Edition

TENTATIVE COURSE SCHEDULE

Topic	Reading
Introduction	MOS Ch.1, Ch 10.2, LDD Ch 1
Introduction to Linux	MOS Ch 10.2, LDD Ch 1, MOS Ch 1.6
Process and Threads	MOS Ch.2.1-2.2,6.1
Scheduling	MOS Ch.2.4
Concurrency	MOS Ch.2.3, 2.5
File Systems	MOS Ch.4.1-4.3
Memory Management	MOS Ch.3.1-3.2
Virtual Memory	MOS Ch.3.3-3.5, 3.7
Input/Output	MOS Ch.5.1-5.4, 4.4

GRADING PROCEDURES

Grades will be based on:

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| • Quizzes: | 10% |
| • Programming assignments: | 30% |
| • Group project: | 20% |
| • Midterm exam: | 20% |
| • Final exam: | 20% |

ACADEMIC INTEGRITY

Undergraduate Honor System

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution. More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at <http://web.stevens.edu/honor/>

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

"I pledge my honor that I have abided by the Stevens Honor System."

Reporting Honor System Violations

Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at www.stevens.edu/honor.

LEARNING ACCOMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

For more information about Disability Services and the process to receive accommodations, visit <https://www.stevens.edu/office-disability-services>. If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at pgehman@stevens.edu or by phone 201-216-3748.

Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

INCLUSIVITY

Name and Pronoun Usage

As this course includes group work and class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.

Inclusion Statement

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

MENTAL HEALTH RESOURCES

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression). Appointments can be made by phone (201-216-5177).

EMERGENCY INFORMATION

In the event of an urgent or emergent concern about the safety of yourself or someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year round. For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct. Other 24/7 national resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text "Home" to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at care@stevens.edu. A member of the CARE Team will respond to your concern as soon as possible.

STATEMENT ON RELIGIOUS OBSERVANCES

Stevens is a very diverse community in which many different religious and ethnic groups are represented. Religious observance is an important reflection of diversity. Stevens is committed to providing equal educational opportunities and supporting students of all belief systems. Students will not be subject to any grade penalties for missing a class, examination or any other course requirement due to a religious observance. Students will not be asked to choose between religious observance and academic work. Therefore, students should inform the instructor in the beginning of the semester if a requirement for this course conflicts with religious observance so that accommodations can be made for students to observe religious practices and complete the requirements for the course.