

CS471 Operating Systems
Department of Computer Science
George Mason University

(This syllabus may be updated throughout the semester)

Location:	CS471-001: Enterprise Hall 80 CS471-003: Merten Hall 1200
Class Time:	CS471-001: T 4.30-7.10 pm CS471-003: R 4.30-7.10 pm
Instructor:	Sapna Gambhir
E-mail:	sgambhi@gmu.edu
GTA:	TBD
GTA Email id	TBD
Office Hours (Professor):	TBD (will share on Blackboard)
Office Hours (TA):	TBD (will share on Blackboard)
Office Location:	R356, Research Hall

DESCRIPTION

This course covers the basic principles of operating systems. Major concepts to be discussed include processes and threads, concurrency and synchronization, CPU scheduling, memory management, virtual memory, storage, and file systems.

In- person classes are going to be held as scheduled. If anything changes, alternate method will be updated on Blackboard.

PREREQUISITES

- Grade of C or better in CS 310
- Grade of C or better in CS 367 or ECE 445
- You must be comfortable for programming in C

BOOKS

- Text Book:
 - Operating Systems: Three Easy Pieces, by Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau, Arpaci-Dusseau (Version 1.00) (free PDF for each chapter [available](#) online).

Reference Books:

- Operating System Concepts by Silberschatz, Galvin and Gagne, 10th Edition, John Wiley & Sons 2018, ISBN: 978-1-118-06333-0.
 - Operating Systems Principles and Practice, by Thomas Anderson and Michael Dahlin, Second Edition. ISBN: 978-0-9856735-2-9, Recursive Books, Ltd.
 - Modern Operating Systems, by A.S.Tanenbaum, 4th Edition. ISBN: 978-0133591620, Pearson Publications
- **Note: Terminology and definitions across different books may not be consistent. Be familiar with what we discuss in lectures!**

COURSE OUTCOMES

The CS department has identified these outcomes as ones that must be met throughout the semester.

- Demonstrate knowledge of operating systems features, evolution, and design.
- Show an understanding of the need for concurrent operation of multiple tasks (processes/threads) and an ability to solve basic process synchronization problems that arise from concurrent operation settings.
- Demonstrate knowledge of process scheduling, basic memory management, storage systems, and file system management.
- Be able to implement basic algorithms for OS services such as memory management and process scheduling.
- Demonstrate knowledge of security threats to an operating system from both processes and networked sources and show an understanding of protection techniques.

- Demonstrate knowledge of how system calls work along with the mechanisms for interrupt handling.

TOPICS

- Introduction
- Processes
- Threads
- Concurrency and Synchronization
- CPU Scheduling
- Memory Management
- Virtual Memory
- Input/Output & Storage
- File Systems
- Protection and Security

CLASS MATERIALS

All class materials are available through the course homepage in Blackboard, accessible from your Blackboard accounts.

ASSIGNMENTS

- All assignments are submitted to Blackboard (<http://mymason.gmu.edu>) by the given deadlines. Grades are also posted on Blackboard for all assignments and homework.
- The students are responsible for keeping back-ups of their work while they are working on assignments. If a student makes multiple submissions, only the last submission will be graded.

PROJECTS

There will be several programming projects using the Operating System OS/161. All projects will be programmed using the C language. Submission of the projects is via the Blackboard.

- All project work must compile and run on Zeus. Zeus is an x86-64 Architecture server running RHEL 8.5 Linux. Instructions for accessing Zeus in general, and from off campus, are in the link (<https://labs.vse.gmu.edu/index.php/Systems/Zeus>)
- Projects are very time-consuming, and most likely are significantly more time-consuming than your projects in other classes. You will need to understand the OS kernel code, design new OS features, and implement and test them!
- Each project will come with the specific instructions, as well as late penalty.
- There is no late token. Always start your project as early as you can!
- Remember to frequently backup your work.
- If your code does not compile, you will get no credit.
- For group programming assignments, each member of the group must make a separate submission. If a student makes multiple submissions, only the last submission will be graded.
- We reserve the right to use [MOSS](#) and other software to detect plagiarism.

GRADING POLICY

Your grade will be calculated as follows:

- 30% Programming Assignments /Projects
 - Can be done individually or with a partner (team of two students)
- 15% Homework assignments
 - to be done individually
 - Drop 1 lowest, Average the rest
- 20% Midterm exam
- 25% Final exam (cumulative)
 - less than 40% will result in an F
- 10% in-class quizzes and activities
 - to be done individually
 - Drop 2 lowest, Average the rest

GRADING SCALE

Grade	Range	Grade	Range	Grade	Range	Grade	Range
A+	$\geq 95\%$	B+	$80\% \leq B+ < 85\%$	C+	$66\% \leq C+ < 70\%$	D	$50\% \leq D < 60\%$
A	$90\% \leq A < 95\%$	B	$75\% \leq B < 80\%$	C	$63\% \leq C < 66\%$	F	$< 50\%$
A-	$85\% \leq A- < 90\%$	B-	$70\% \leq B- < 75\%$	C-	$60\% \leq C- < 63\%$		

Note: minimum score of 40% is required on the Final exam to pass this course.

NOTE:

- Exact Schedule for Final Exam will be shared on Blackboard and There is no make-up for missed exams. **Makeup exam may be given only if proper documentation is provided explaining why you missed the exam.** Only 80% of the credit (what one earns in the makeup exam) may be counted in making the final grade.
- No make-up for in-class activities or quizzes.
- It is critical that the students double check the files they are submitting, as submitting a wrong, corrupted, or empty file is very likely to result in a score of 0 for that assignment.
- If you think your work is not correctly graded then you must initiate contact with the grader within a week of receiving the grade (either email or on the Blackboard). Grade contesting beyond this time window will not be allowed.
- The midterm and final exams will be closed book. Missing the midterm or the final exam will result in an F.
- The students are supposed to work individually on the homework, assignments and projects, unless told otherwise. We reserve the right to use MOSS to detect plagiarism.
- Use of public code repositories for course projects during the semester or after the semester is over (to avoid future plagiarism).
- Use of any automated, AI, ML, external, or otherwise not-you source to complete any assigned work will result in an honor code violation and result in an F in the entire course.

- If the campus closes or class is canceled due to weather or other concern, students should check Blackboard [or other instruction as appropriate] for updates on how to continue learning and information about any changes to events or assignments.

ACADEMIC INTEGRITY

You are expected to abide by the [University's honor code](#) and the [CS Department's Honor Code and Academic Integrity Policies](#) during the semester, i.e., collaboration between students in different groups on an assignment is unacceptable. Any violation of the honor code will result in referral to the honor council.

DISABILITY STATEMENT

If you have a learning or physical difference that may affect your academic work, you will need to furnish appropriate documentation to [GMU Disability Resource Center](#). If you qualify for accommodation, the DRC staff will give you a form detailing appropriate accommodations for your instructor. If you have such a condition, talk to me during the first week of the term about the issue.

SEXUAL HARASSMENT AND INTERPERSONAL VIOLENCE

As a faculty member and designated "Responsible Employee," I am required to report all disclosures of sexual assault, interpersonal violence, and stalking to Mason's Title IX Coordinator per university policy 1412. If you wish to speak with someone confidentially, please contact the Student Support and Advocacy Center (703-380-1434) or Counseling and Psychological Services (703-993-2380). You may also seek assistance from Mason's Title IX Coordinator (703-993-8730; titleix@gmu.edu).

INCLUSION

We believe in an equitable and just work and learning environment. We welcome and value individuals and their differences including race, economic status, gender expression and identity, sex, sexual orientation, ethnicity, national origin, first language, religion, age, and disability.

PRIVACY AND EMAIL

- Students must use their GMU email account to receive important University information, including communications related to this class.
- To protect your privacy, I also cannot list your GMU email address on any public forum or provide it to any other students.
- Video recordings of class meetings that are shared only with the instructors and students officially enrolled in a class do not violate FERPA or any other privacy expectation.
- Email me for any personal issues such as medical situations, disability accommodations, etc. Due to the size of the class, please do not e-mail me your concept and Assignment/ Project doubts, use office hours and Piazza for that!