The University of Texas at El Paso
Computer Science Department
Syllabus

MD Armanuzzaman

Course Information

CS 4375: Operating Systems Concepts
Term: Fall 2025
Delivery Method: In-person
Meeting Days and Time: *MW, 10:30 AM - 11:50 AM*
Location: *CCSB G.0208*

Instruction Information

MD Armanuzzaman, Assistant Professor
Email: `marmanuzzaman@utep.edu`
Office Location: CCSB 3.1008
Office Hours: Microsoft Teams Link

- In-person, or virtual on Teams: *MW, 1.00 PM to 2.20 PM*
- Or by appointment

Teaching Assistant
Daniel J Marin
Email: `djmarin1@miners.utep.edu`
Office Location: CCSB 1.0706
Office Hours: Microsoft Teams Link

- In-person, or virtual on Teams: *WF, 3.00 PM to 5.00 PM*,
- Or by appointment

Course Description

CS 4375 is a course about the systems-level software called the operating system that provides an interface between application software and the computer hardware. The operating system is responsible for sharing resources, providing common services, and protecting programs from interference from other programs. Topics covered in the course include process management and scheduling, concurrency, interprocess communication, memory management, input/output management, file systems, and networking basics.

Course Schedule

The course schedule may be found on the course website: CS 4375 Schedule. The schedule is subject to change depending on needs of the class.

Learning Outcomes

The CS Department approved course learning outcomes are in the appendix

Required and Supplementary Materials

- Required: **Operating Systems: Three Easy Pieces**, by Remzi H. ArpaciDusseau and Andrea C. Arpaci-Dusseau. https://pages.cs.wisc.edu/~remzi/OSTEP/
- Required: **xv6: a simple, Unix-like teaching operating system**, by Russ Cox, Frans Kaashoek, and Robert Morris. RISC-V version. https://pdos.csail.mit.edu/6.1810/2024/xv6/book-riscv-rev4.pdf
- Recommended: **The C Programming Language**, 2nd edition, by Brian Kernighan and Dennis Ritchie,
- Supplementary: **The Linux Programming Interface**, by Michael Kerrisk. https://nostarch.com/tlpi
- Other readings and resources will be posted on the course webpage.

Assignments and Grading

Grades will be recorded and calculated using BlackBoard.
Grade Distribution:
A = 1000-900 **B** = 899-800 **C** =799-700 **D** = 699-600 **F** = 599 and Below

- 500 points: Homework assignments
- 100 points: Quizzes
- 150 points: Midterm exam
- 250 points: Final exam

Homework assignments: Homework will consist of six programming assignments. We will use the *xv6* teaching operating systems from MIT for most of the assignments, primarily the *RISC-V* 32-bit version. Homework assignments will be assigned on Teams and turned in using GitHub. Late homework assignments will not be accepted.

Quizzes: Quizzes will be mostly unannounced, will be given at the beginning of class, and will cover assigned reading and lectures.

Midterm exam: The midterm exam will cover the first half of the course. The midterm exam will be given in class the eighth week of class.

Final exam: The final exam will be comprehensive – i.e., it will cover the entire course. The final exam will be given during the designated exam period for the class.

Technology Requirements

Some course content is delivered via the Internet through the Blackboard learning management system. Ensure your UTEP e-mail account is working and that you have access to the Web and a stable web browser. Google Chrome and Mozilla Firefox are the best browsers for Blackboard; other browsers may cause complications. When having technical difficulties, update your browser, clear your cache, or try switching to another browser.

You will need to have access to a computer on which you can run Linux with *root privileges* either natively, inside a virtual machine (e.g., using *VMware* Fusion on a *MacBook*), or using Windows Subsystem for Linux (*WSL*) on a Windows machine. If you do not have your own computer that will work for this purpose, other options include borrowing a laptop from the CS Department or signing up for a cloud computing service, some of which offer free credits or tiers for students. The version of Linux you should use is *Ubuntu 22.04 LTS*.

Course Communication

Here are the ways we can keep the communication channels open:

- **Office Hours:** I will have office hours for your questions and comments about the course. My office hours are in-person; however, you can request a virtual meeting using Teams. The TA will also hold office hours, time and location *CCSB 3.1008*. Office hours are NOT for the purpose of getting the instructor to debug your programs – that is your job!
- **Email:** UTEP e-mail or Teams are the best ways to contact me. I will make every attempt to respond within 24 hours during weekdays. When e-mailing me, be sure to email from your UTEP student e-mail account and please put the course number in the subject line. In the body of your e-mail, clearly state your question.
- **Microsoft Teams:** We will use teams for posting assignments and for class discussion. The name of the team for the class is CS4375. There will be a separate discussion channel for each homework assignment. Please post general questions or comments on the General channel and post questions or comments about an assignment on the specific assignment channel.
- **Announcements:** Check the Blackboard announcements and Teams frequently for any updates, deadlines, or other important messages.

Attendance and Participation

Our class meetings are in-person in *CCSB G.0208*, every *Monday* and *Wednesday* from *10.30 AM* to *11.50 AM*, beginning August *25th* through December *4th*. I will take attendance so that I know who is attending class. Attendance and participation in the class are important for your learning and success and to create a community of learners. The class will be taught using a collaborative and inclusive classroom approach. Lectures will be delivered, along side activities, discussions, and assignments in groups. You are expected to prepare for each class by doing the assigned reading and watching the assigned video lectures. When a class is designated for work on a specific homework assignment, you are expected to come prepared with initial work on the assignment, with questions about the assignment, and with the equipment required to work on the assignment during class.

Illness Precautions

Please stay home if you have symptoms of a communicable illness. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations.

Course Drop Policy

According to UTEP Catalog, "At the discretion of the instructor, a student can be dropped from a course because of excessive absences or lack of effort. A grade of "W" will be assigned before the course drop deadline and a grade of "F" after the course drop deadline." See Policies and Regulations in the UTEP Undergraduate Catalog for a list of excused absences. Therefore, if I find that, due to excessive absences or nonperformance in the course, you are at risk of failing, I will drop you from the course. I will provide 24 hours advance notice via email.

Deadlines, Late Work, and Make-up Work

Homework assignments will be due by **11:59pm** on the due date. If a due date is changed for some reason, it will be changed for the entire class. No late work will be accepted if the reason is not considered excusable. Since I will go over homework assignments in class the day after they are due, make-up for an excusable reason will involve a different assignment.

Make-up work will be given only in the case of a documented emergency. Note that make-up work may be in a different format from the original work, may require more intensive preparation, and may be graded with penalty points. If you miss an assignment and the reason is not considered excusable, you will receive a zero. It is therefore important to reach out to me—in advance if at all possible—and explain with proper documentation why you missed a given course requirement. Once a deadline has been established for make-up work, no further extensions or exceptions will be granted.

Alternative Means of Submitting Work In Case Of Technical Issues

I strongly suggest that you submit your work with plenty of time to spare in the event that you have a technical issue with Teams, GitHub, your network connection, and/or your computer. I also suggest you save and backup your work frequently. Accidentally losing your work will not be considered an acceptable excuse for missing an assignment deadline. As a last resort, you may email me and the TA a backup copy of your work if that is the only way you can meet the deadline.

Incomplete and Grade Policy

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the UTEP Center for Accommodations and Support Services (CASS). Contact the

Center for Accommodations and Support Services at *915-747-5148*, email them at cass@utep.edu, or apply for accommodations online via the CASS portal.

Scholastic Integrity

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as ones' own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the **Office of Student Conduct and Conflict Resolution (OSCCR)** for possible disciplinary action. To learn more, please visit **HOOP: Student Conduct and Discipline**.

Guidance On Artificial Intelligence

The use of generative AI tools such as Chat GPT is permitted in this course for the following activities, which must be noted or cited: **Discovering algorithms for solving problems**

However, you may not use AI tools to complete the following activities: **Generating code for programming assignments**

Students must cite any borrowed content sources to comply with all applicable citation guidelines, copyright law, and avoid plagiarism. Instances that violate these guidelines will be referred to the Office of Student Conduct and Conflict Resolution.

Plagiarism Detecting Software

Some of your course work and assessments may submitted to SafeAssign, a plagiarism detecting software. SafeAssign is used to review assignment submissions for originality and will help you learn how to properly attribute sources rather than paraphrase.

Course Resources:

UTEP provides a variety of student services and support:

- Technology Resources
  - Help Desk: Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in person if on campus.
- Academic Resources
  - UTEP Library: Access a wide range of resources including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.

- University Writing Center (UWC): Submit papers here for assistance with writing style and formatting, ask a tutor for help and explore other writing resources.
- Math Tutoring Center (MaRCS): Ask a tutor for help and explore other available math resources.
- History Tutoring Center (HTC): Receive assistance with writing history papers, get help from a tutor and explore other history resources.
- RefWorks: A bibliographic citation tool; check out the RefWorks tutorial and Fact Sheet and Quick-Start Guide.
- The Miner Learning Center: Join peer-led study sessions in person or online to review content and discover study strategies in core curriculum courses.
- UTEP Edge: UTEP's cross-campus framework for student success and empowerment – develops students' assets through high-impact experiences made possible by the expertise and dedication of faculty, staff, alumni, and community partners.

Individual Resources

- Student Success Help Desk (SSHD): Students experiencing challenges or obstacles to academic success including registration, financial, food, housing, and transposition resources my submit a ticket request assistance to studentsuccess@utep.edu
- Military Student Success Center: Assists personnel in any branch of service to reach their educational goals.
- Center for Accommodations and Support Services: Assists students with ADA-related accommodations for coursework, housing, and internships.
- Counseling and Psychological Services: Provides a variety of counseling services including individual, couples, and group sessions as well as career and disability assessments.
- UTEP Food Pantry: Non-perishable food items are available to students who are currently enrolled in classes. Bring a Miner Gold Card to Memorial Gym, Room 105, Monday through Friday, 10 a.m. to 2 p.m.

Appendix. CS 4375 Learning Outcomes

Level 1

- V1i. Choose a scheduling approach suitable for given simple problem.
- V1j. Explain segmentation and its security implications.
- V1l. Explain some ways in which virtualization creates vulnerabilities.
- V1m. Explain the components of process and virtual machine context.
- V1n. Explain the need for paging and the basics of demand loading.
- V1o. Describe the motivation for and gross characteristics of a trusted computing base.
- V1x. Explain how domain names, IP addresses, file names, and memory segments are handled.
- C1c. Given an application, identify the factors relevant to choosing a synchronous or asynchronous solution.
- E1f. Choose when to use datagram versus virtual-circuit communication.
- E1h. Differentiate transmission and propagation latencies and some factors affecting them.

- E1i. Explain how data is serialized (byte order, representation, buffering).
- E1l. Interpret the output of a packet capture tool.
- E1n. Explain the role of cryptographic hashes and symmetric and asymmetric keys in security.
- E1o. Explain domains names, IP and MAC addressing and how they support administration and data locality.
- E1p. Explain the functionality handled at different network layers.
- E1q. Explain some concepts in storing files on disk.
- E1r. Explain the memory hierarchy and the basic concepts of distributed storage.
- E1s. Explain generic device APIs, including the bidirectional handling of interrupts and requests.

Level 2

- V2q. Use the concepts of process state and state transition to characterize system and process behavior.
- V2r. Relate the distinction between supervisor and user permissions to the design and implementation of system calls.
- V2t. Write programs that use interprocess communication, specifically pipes and/or sockets.
- V2u. Use simple system calls for common needs.
- C2g. Implement producer-consumer coordination.
- C2h. Build a server-side program that uses multi-threading to handle multiple simultaneous clients.
- C2i. Identify situations where deadlock may occur and suggest ways to prevent it.
- A2g. Perform simple arithmetic computations related to major families (for example, determine page number or whether an address is within a power-of-2 segment).

Level 3

- V3w. When a process or a computer is running too slowly, infer some probable causes.
- V3p. Choose among virtual machines, processes, containers and sandboxes as ways to support common programmer needs.
- C3j. Distinguish when blocking versus nonblocking calls are appropriate.