CSCI 447 – Operating Systems
Fall 2026

Time: MTWF 9AM

Place: CF 225

Instructor: Phil Nelson

Office: CF473

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Office Hours: 1:00-2:00 PM T, 2:00-3:00 PM MWF, others by appointment. If you send me e-mail, please use plain text (no HTML) messages and include "CSCI 477" in the subject of your e-mail.

Web Access: I have information for this class on the web and Canvas. Assignments will be available on Canvas at the appropriate time. Other information will be provided via the web and Canvas. If you see something missing from the web site or Canvas, please let me know about it via e-mail. My web site is `https://facultyweb.cs.wwu.edu/~phil/classes/f26/447`.

Text: Siberschatz, Galvin, Gagne "Operating System Concepts", John Wiley & sons, 10th Edition, 2019.

Description: This class will give the student an understanding of internal workings of operating systems.

Outcomes: On competition of this course, students will demonstrate:

- Thorough understanding of virtual memory.
- Thorough understanding of process scheduling and the system implementation of multi-threaded kernel and applications.
- Thorough understanding of memory management techniques in operating systems, including the concepts of implementation of virtual memory.
- Thorough understanding of the implementation of file systems and device control.
- Basic understanding of distributed file systems and operating systems.

Graded Work: 3 Tests and Assignments. Attendance will also be part of the final points.

Tests: The first test will be given in class on Friday, October 16. The second test will be given in class on Friday, November 13. The final will be given at the regular final time of 8:00 AM on Monday December 7. Each test will be worth 15% of your final grade. To pass this class you must get at least 50% of the test points.

Assignments: The assignments will be both written and programming. All points will go into a grand total for the assignments. These assignments will be worth 53% of your final grade. Assignments are currently scheduled to be due on September 29, October 6, October 13, October 21, October 30, November 10, November 20 and December 4.

December 4 is the last day of prep week.

Attendance: Due to low attendance in the recent past, I have now instituted an attendance requirement. This will be worth 2% of your final grade. There are 39 class periods in the quarter. Two of those are tests. There are then 37 class periods where attendance will be taken. On time gives you 2 points, late up to 10 minutes gives you 1 point and late after 10 minutes or absent you get no points for attendance.

Late Work: Work is due *at the beginning of class on the day due.* To be considered "on time", you must submit the required document on Canvas before the time due. Late work is accepted. For assignments 1 and 2, you may turn in late work up to TWO meetings of the class late. Late work turned in at by the second meeting of the class will be worth 75% of the original value. For assignments 3 to 8, anything turned in after the two days will be worth 60% of the original value. A late final assignment is worth 75% of the original up until midnight December 8, a day after the final test. Canvas is set up to not accept late work after the two meetings of the class for Assignments 1 and 2. So, an assignment due on Wednesday is accepted at the 75% rate until the beginning of class on the following Monday.

Grading: Grading is done by a percentage of the top score. I reserve the right to pick a fictious top score at or above the 90% of total possible if nobody earns at or above 90% of total possible. The following is my normal grade scale:

A: 100% – 90% of top score

B: 89% – 80% of top score

C: 79% – 65% of top score

D: 64% – 50% of top score

Note: Grades on tests and assignments are not modified in the grade book to match this scale. This scale is used only at the end of the class for assigning letter grades.

Collaboration: Each student *MUST* do their own programming. **Original work is required.** Assume you should not see the source code of any other student, past or present. Assume you should not ask any AI engine for a solution to your programming. You may discuss problems using diagrams on scratch paper or white boards, work together to understand the problems, but you should not design solutions together. You should not see any other student's source code or pseudo code for solutions. Whiteboard coding together is cheating for this class. Even helping a fellow student debug their program so that source code is seen should be avoided. Students having problems should e-mail me or visit my office. I am your BEST source of help to get your work finished.

Academic Dishonesty: Is (obviously) not allowed. If you do violate the Academic Honesty Policy and are caught you will receive an F as your grade for the class. This includes *ALL* students knowingly involved in any event. Not properly protecting your source code may be considered knowingly involved. White board coding of solutions is considered a violation. I use mechanical means to compare student programs. These comparisons are used to raise the possibility of a violation, but all decisions about violation will be made by me after inspecting the programs of all students involved. *DO NOT* recycle your program printouts in the school's recycle bins or where other students in this class have access to them.

AI: The point of the class is to help YOU understand the internals of Operating Systems. You may use AI to help you understand the content of the class. You may not use AI to help you write the programming assignments. For example, you could upload the ToyOS document to AI and then ask it to summarize it or ask specific questions about ToyOS. Uploading the actual assignment document and asking for coding help is like asking a fellow student to help you code. (You should not even upload the assignment document as the AI may choose to help you with code when you didn't ask for it.) **I consider it a violation of the academic honesty policy to upload the assignment documents.** It is also a violation to ask for help with coding your assignments. A good use for AI may be to help you study for a test. Asking AI to create multiple choice questions over the class content may help you prepare for my multiple choice questions. (It is not guaranteed to help.)

Final Assignment: Your final assignment will be due on December 4, 2026, the last class of dead week. A late final assignment will be worth 75% of its original value until midnight on December 8, a day after the final test.

Western Syllabus Policies: For generic syllabus policies of Western, visit: `https://syllabi.wwu.edu`.

Outline of Course: Expected order:

- Introduction to OSes
- Basic OS structures
  - Services
  - System calls
  - Operating System Structure
  - Virtual Machines
  - System Boot
- Processes
  - Process abstraction
  - Process scheduling
  - Interprocess Communication
  - Threads in the OS
  - Implementation of threads
  - Synchronization
  - Deadlocks
- Memory Management
  - Main Memory
  - Swapping
  - Paging
  - Virtual Memory
  - VM implementation and issues
- Storage Management
  - File systems
  - Kernel File System Structures
  - FS implementation
  - Mass storage
  - I/O systems
- Protection and Security
  - Protection Goal
  - Protection Methods
  - Security issues
  - Security techniques
- Introduction to Distributed Systems
  - Basics of Distributed Systems

  - Subsystems of DS
  - Basics of Distributed File Systems
- Other OS topics as time allows