CSCI 447 – Operating Systems
Fall 2023

Time: MTWF 9am and 11am

Place: CF 316

Instructor: Phil Nelson

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Office Hours: 2:00-3:00 PM MTWF, 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 to help your e-mail not be classified as spam.

Web Access: I have information for this class on the web and Canvas. Assignments and tests 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/f23/447.


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.
**Tests:** The first test will be given in class on Friday, October 20. The second test will be given in class on Wednesday, November 15. The final will be given at the regular final time of 8:00 AM on Monday December 11 for the 9AM section and 8:00 AM on Wednesday December 13 for the 11AM section. 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 55% of your final grade. Assignments are currently scheduled to be due on October 3, October 11, October 18, October 27, November 6, November 14, November 28 and December 8. December 8 is the last day of dead week.

**Late Work:** Work is due at the beginning of class on the day due. Work will be accepted up to TWO meetings of the late, at which time the work will be worth 75% of the original value. A late final assignment is worth 75% of the original up until the start of the final test. Canvas is set up to not accept late work after the two meetings of the class. So, an assignment due on Wednesday is accepted 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 use 90% as the top score if all students are below that mark. 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

**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. You may discuss problems using diagrams on scratch paper or white boards, but you should not see source code. 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 ask to visit me in my Zoom office.

**Cheating:** Is (obviously) not allowed. If you do cheat and are caught you will receive an F as your grade for the class. This includes ALL students knowingly involved in any cheating event. Not properly protecting your source code may be considered knowingly involved. I may use mechanical means to compare student programs. These comparisons are used to raise the possibility of cheating, but all decisions about cheating 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.

Final Assignment: Your final assignment will be due on December 8, 2023, the last class of dead week. A late final assignment will be worth 75% of its original value until the start of 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