CSE 3183, Systems Programming
Spring 2024

Instructor

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Office: Butler 215

Office Hours: Monday, Wednesday 8:15 – 9:30, 12:00 – 1:30, 3:30 – 4:30

Tuesday, Thursday 8:15 – 11:15, 2:30 – 4:30

Class Meetings

Section 01: Monday, Wednesday, Friday 10:00 – 10:50.

Section 02: Monday, Wednesday, Friday 2:00 – 2:30

Section 501: Asynchronous Distance Class

Prerequisites

CSE 2383 – Data Structures and Analysis of Algorithms (with a grade of C or better)

Description

Three hours lecture. Introduction to key concepts and methods used in the implementation of systems level programming on a UNIX-like system. Topics include system calls, file I/O, the creation and management of processes, signals, interprocess communications, network communications, and threading.

Textbook

The Linux Programming Interface: A Linux and UNIX System Programming Handbook, No Starch Press, Michael Kerrisk ISBN: 9781593272203

Topics

TOPICS COVERED:	(Number of class hrs)
What is Systems Level Programming?	1
Fundamental Concepts	2
Basic File I/O	3
Universal I/O Model	
Using Files	
The File System	3
Links	
Working with Directories	
File Information	
Permissions	
Timers	3
The Linux Clock	
Working with Clocks	
Timer Signals	
Signals	3
Concepts	
Sending a Signal	
Managing Signals	
Blocking Signals	
Creating Processes	3
Process ID	
Creating a new process: fork/exec	
Managing Processes	3
Terminating a process	
Waiting for a process	
Basics of Threading	3
Creation	
Cancellation	
Managing Threads	3
Thread-Specific Data	
Synchronization and Critical Sections	
vs Processes	
Interprocess Communications using Files	3
Pipes	
FIFOs	
Interprocess Communications using Memory	3
Shared Memory	
Synchronization Mechanisms	3
Semaphores	
Network Communications	3
Client-Server Model	
TCP/IP	3
Tests	3

Grading Policy

Tests

Three (3) tests will be given in this course; each of these tests will be in class, open resource tests with questions focusing on the programs you have completed until then. You will be free to use your notes and textbook as a reference when completing the test. You cannot seek outside assistance. A comprehensive final exam will also be offered. If you choose to take the final exam, your final exam score will replace your lowest test grade.

No make-up tests will be offered after the test has been given. Any students expecting to miss a test due to an excused absence must contact the instructor before the day of the test, and the test must be made up before the scheduled date of the test.

The final exam can replace the grade of one missed test if the absence on the scheduled test date was excused.

Programming Assignments

There will be numerous programming assignments in this class. They will consist of one or more small programs every week or two weeks.

Each exercise will be graded with the following guidelines:

    The program uses proper Systems Programming function calls – 25 pts
    The program accomplishes the required tasks – 25 - 50 pts
    The program compiles – 25 pts

Programs that fail to compile will earn no more than 25 pts.
Failure to submit a program by the deadline will result in a 0.
Programs that fail to make an honest attempt at accomplishing the task will also result in a 0.
Don't submit Hello World and think you will get credit.

ALL programming assignments must be completed in C unless otherwise stated. Any assignment that is completed in another language will receive a grade of zero.

Only submit files containing source code and analysis answers/report. All completed code must be in .c/.h files, and all reports/answers to analysis questions must be submitted as a pdf file. If a student fails to submit the correct files, the following penalties will result:
  • For Code: A grade of zero may be given for the code portion of the score.

<div align="center">Quizzes</div>

There will be one quiz every week; these classes will be online. Make-up quizzes will only be allowed for excused absences.

<div align="center">Guided Exercises</div>

There will usually be one or more programming exercise every week; these exercises are not graded but completing them can help your understanding in the class. These exercises are designed to reinforce your programming experience with the various system programming constructs introduced each week.

<div align="center">Standards of Achievement</div>

Assessments			Scale	
Program Assns	30%		A	>=90%
Tests	60%		B	80%-89%
Quizzes	10%		C	70%-79%
			D	60%-69%
			F	<60%

Computers

All students are expected to have a working laptop computer that meets minimum specifications. See the Bagley College of Engineering web site for more details: http://www.bagley.msstate.edu/computer/

The laptop will be used to complete tests, quizzes, and programming assignments. Failure to bring your laptop to class or laptop malfunctions are not permissible excuses for missing a test, missing a quiz, or failing to complete a programming assignment.

All instructions given during this course will assume that the student is using Windows 10 on their laptop. If you choose to use Mac OS or Linux as your operating system, you are accepting the responsibility for learning how to use any and all software (operating system, web browser, browser plugins required for tests and quizzes, compiler, file transfer programs, etc.) without assistance.

OS, Compiler, and Integrated Development Environment

The CSE 3183 course is taught in the context of a UNIX-like OS; for this reason, every student will need to have access to UNIX-like OS. We recommend the installation and use of a virtual machine on your computer. The virtual machine I use on my computer is Oracle's VirtualBox, but another virtual machine such as VMware works as well.

You will need to install a distribution of Linux on that virtual machine. I am using Ubuntu 20.04.

If you already use Mac OS X or Linux as your operating system you won't need to follow the above suggestions.

All programs for CSE 3183 will be written in C. We recommend installing GNU's gcc compiler as well as a text editor such as emacs or jove to aid in writing these programs.

Programming Assignments

Late Policy

Every assignment must be turned in by the due date specified to receive full credit. Students have 24 hours to turn in an assignment after it is late. If the assignment is turned in before 24 hours has passed after the due date, then a 10 percent penalty per day late will apply. Any assignment turned in after the 24-hour deadline will automatically receive a grade of zero.

Collaboration

In absolutely no circumstances should any student share code used in an assignment with another student unless given permission to by the instructor. Any students sharing or accepting assignment without instructor permission will be reported for an honor code violation. Please refer to the Academic Honesty section for more information.

Referencing

Copying code (from other students, from the internet, etc.) to submit as your own work is not appropriate. Any material (other than the textbook and course slides) used while writing code must properly cited. Referenced material should only include pseudocode or materials explaining the topic without code.

Attendance

This course will follow MSU's class attendance policy. For details, see
- http://catalog.msstate.edu/undergraduate/academicpolicies/classattendance/
- http://www.policies.msstate.edu/policypdfs/1209.pdf

The following are acceptable excuses for absences:
- Participation in an authorized university activity.
- Death or major illness in a student's immediate family.
- Participation in legal proceedings or administrative procedures that require a student's presence.
- Religious holy day.
- Illness that is too severe or contagious for the student to attend class.
- Required participation in military duties.
- Mandatory admission interviews for professional or graduate school which cannot be rescheduled.
- An illness or injury of a student's immediate family.

A student is expected to have proper documentation for an excused absence. Failure to provide adequate

documentation will result in the absence not being excused. The instructor may ask the student to obtain verification of their excused absence through the Dean of Students Office.

Students auditing the course are required to attend every class meeting. The only exception to this rule is if the absence is excused, as described above.

Final Exam Date/Time

http://www.registrar.msstate.edu/Students/examschedule.html

University Syllabus

The Mississippi State University Syllabus contains all policies and procedures that are applicable to every course on campus and online. The policies in the University Syllabus describe the official policies of the University and will take precedence over those found elsewhere. It is the student's responsibility to read and be familiar with every policy. The University Syllabus may be accessed at any time on the Provost website under Faculty and Student Resources and at
https://www.provost.msstate.edu/faculty-student-resources/university-syllabus