Instructor: Patti Iles Aymond
3270A Patrick F Taylor Hall
paymond@lsu.edu (**best way to reach me**)
(225) 578-4359

Lecture: MW 1:30 – 2:50 AM;
2324 Patrick F Taylor Hall
or
117 Tureaud, **when announced**

Office Hours: Monday & Wednesday
10:45AM – 12:15PM, and By Appointment

Teaching Assistant
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Course Description

Batch process systems programs, their components, operating characteristics, user services and limitations; implementation techniques for parallel processing of input-output and interrupt handling; overall structure of multiprogramming systems on multiprocessor hardware configurations; addressing techniques, core management, file system design and management, system accounting and other user-related services; traffic control, interprocess communication, design of system modules and interfaces; system updating, documentation and operation. Prerequisite: CSC 4103: Operating Systems.

Course Objectives

- Master in using the C++ programming language, its constructs and grammar, in the creation of system software.
- Master in file I/O (i.e. open, close, read, write, seek).
- Master in the usage of makefiles, linking, object files, loading, symbol resolution, shared and static libraries, debugging, and execution of system programs.
- Be familiar with basic Linux/UNIX OS concepts, such as process, program, process groups, signals, running programs, process control, address space, user and kernel modes, system calls, and context switching.
- Be familiar with operating within a collaborative team environment.
- Be familiar with using sockets to implement interprocess communication.
- Be familiar with using thread execution models.
- Be familiar to handle signals and exceptions within a process and to control processes.
- Be familiar with different approaches of concurrent programming.
- Be familiar with batch processing systems.
- Be familiar with remote execution techniques.

Course Layout

- **Course Lectures:** Course lectures will be 1 hour and 20 minutes long, twice per week. All assigned reading is expected to be completed before class.
- **Programming Assignments:** Programming assignments will be made available in Moodle. These are to be completed and uploaded to Moodle, as instructed. All submitted programs must successfully run from the Linux command line on the classes account provided for the class, unless otherwise specified. All programming assignments must include a Linux shell script that will run the program in the Linux environment. All programming assignments must be accompanied with one or more unit test that evaluate(s) the breadth, depth, and variability of program functionality.
- **Class Project:** Students will work together in a collaborative environment to tackle a complex problem within the problem domain posed by the instructor. Students are expected to work together, divvy up responsibilities, and share resources in the implementation of the project. Every student is expected to do their fair share of

work on the project. A student's project grade will be proportionally adjusted based on level of effort expended on the project. A student cannot successfully complete this course without substantive contribution to the team project.

- **Exams:** There will be one, 1 hour and 20 minute, midterm exam and a two hour final exam. Arrangements for a make-up test must be made prior to the test. The instructor will be following LSU policy PS-22 with regards to valid reasons for missing an exam.

Evaluation

Grading will be based on programming assignments, the class project and two exams:

Midterm Exam	25%	Programming Assignments	15%
Final Exam	25%	Class project	30%
		Homework/Quizzes/Attendance	5%

The final exam is not cumulative.

Final grade will be determined by overall average as follows:

Score	Grade	Score	Grade	Score	Grade
90-92.99	A-	93-96.99	A	97-100	A+
80-82.99	B-	83-86.9	B	87-89.99	B+
70-72.99	C-	73-76.99	C	77-79.99	C+
60-62.99	D-	63-66.99	D	67-69.99	D+
0-59.99	F				

Textbooks

Required Texts:

- Computer Systems: A Programmer's Perspective by Bryant & O'Hallaron
- Advanced Programming in the UNIX Environment by W. Richard Stevens

Recommended Texts:

- C++ for Programmers by Paul J & Harvey M Deitel
- Linux for Programmers and Users by Graham Glass and King Ables

Course Topics

Course topics are expected to include, but are not limited to:

- The C++ programming language: C language basics, the C++ standard template library (STL), OOP in C++, mastering pointers, template development
- Brief introduction to the Linux/Unix OS
- Program Structure and Execution
- Running Programs on a System
- Exceptional Control Flow
- Virtual Memory
- System Level IO
- Network Programming
- Concurrent Programming

Class Policies

- Class Attendance: Students are required to attend class. Class time will be frequently used as project time; if students are not in class, their team will be adversely affected by their absence. Class attendance on project milestone dates count double.
- Moodle: The course Moodle will be the official avenue for communication between the instructor and students. Moodle will be used for providing general course information, making announcements, making assignments, turning in assignments, and posting grades. Check it often for new or updated information. If you don't see something in Moodle that you think should be there, report it to the instructor as soon as possible.
- Communication: All electronic communication between students and the instructor and teaching assistants should maintain a professional decorum (e.g., address the recipient properly and use whole words, complete sentences, and proper grammar). Be sure to include enough detail of the problem so that you form a well-thought out question. The more detail you can give as to your problem, the more likely the instructor or teaching assistant will be able to help you.
- Distractions: Please silence your phones and put them away at the beginning of every class. If you receive an urgent call or text during class, please take the device into the hall to complete your call/text. If you must enter class late or leave early, please do so as quietly as possible. Please avoid activities that will distract your classmates (e.g., talking, rustling papers, moving around), etc. The instructor reserves the right to expel a student from the lecture room for distracting, disruptive, or disrespectful behavior.
- Use of Electronics in Class: The use of electronics in class is no allowed during the lecture portion of class. This includes laptop computers, tablets, and telephones. You will receive a copy of the class lecture slides, so you can concentrate on engaging with the class rather than capturing notes.
- Grading Change requests: All grades are uploaded to the course Moodle. Concerns about grades must be addressed within one week after the graded work is made available. Thereafter, all grade book entries are final. Grade change requests must be submitted to the instructor, in writing, and must include the following:
    - Name of student
    - Date of the assignment/project/exam
    - Date of submission
    - Course number
    - List of the items that need to be corrected along with a concise reason as to why the grade change is needed.
    - Original assignment/test/quiz (not a copy).

  Grade change request decisions are at the discretion of the instructor and will be returned as the instructor has time to complete the regrade. Final exam and final grade change requests can be submitted up to two weeks after the final exam. After that time, grade change requests will be denied.
- Due Dates: **All work intended for grading must be submitted on time.** Any work not submitted before the cut-off period is not graded. Programming projects, homework assignments, and project artifacts will be submitted via assignments or quizzes on the course Moodle. Moodle is unforgiving, so do not wait until the last minute to upload your assignment.
- Missed Assignment/Exams: A grade of 0 is awarded for missed assignment/exam in the absence of a valid excuse, as determined by the instructor. In the unusual circumstance that you must miss an assignment or exam due to medical reasons or other unforeseen emergency, you need to notify the instructor as soon as possible and provide sufficient documentation to verify the claim. The instructor will be following LSU policy PS-22 with regards to valid reasons for missing an exam. If the instructor deems that the excuse is valid and sufficiently documented, the instructor will determine how the missed work will be made up, depending on the circumstance.
- Special Accommodation: Students who have a disability that require accommodation(s) should make an appointment with the Office of Disability Services (Phone (225) 578-5919 or TDD: (225) 579-2600) to discuss their specific needs and present a letter from the ODS informing the instructor of their needs. All such matters, by University regulations, are strictly confidential.

- Collaborative Work: All class exams, quizzes, homework, and programming assignments must be the independent work of the student. Students are encouraged to work together on programming projects, but the work you turn in must be your own. In other words, you can discuss problems and approaches to your programs, but you should never share source code. Students are not allowed to use another student's work, in part or in total, as their own work. Students are allowed to search for and use online and published sources of approaches, algorithms, and code. All approaches, algorithms, and code obtained from an outside source must be clearly marked in all turned in work or it will be considered plagiarism and academic dishonesty.
- Exam Dates:
  - Midterm Exam: Wednesday, October 9, in **117 Tureaud**
  - Final Exam: Saturday, December 14; 7:30-9:30AM, in **117 Tureaud**
- Project Dates:
  - Project Kickoff: Monday, September 9
  - Project Milestones #1: Monday September 30
  - Project Milestone #2: Wednesday, October 30
  - Final Project Presentations: Monday, November 18 and Wednesday, November 20
  - Project Post Mortems: Wednesday, December 4, in **117 Tureaud**
- Important University Dates:
  - Wednesday, September 4 – Final day to drop without a W (4:30 PM deadline)
  - Friday, November 8 – Final day for dropping classes (4:30 PM deadline)
  - Friday, November 8 – Final day to request rescheduling a final examination when three examinations are scheduled in 24 hours

Academic Integrity

- Students are required to abide by the LSU Code of Student Conduct Handbook. "LSU is an interactive community in which Students, faculty, and staff together strive to pursue truth, advance learning, and uphold the highest standards of performance in an academic, social, and social media environments" [from LSU Code of Student Conduct]. It is assumed that all students enrolled in this course have read the Code of Student Conduct – specifically section 10.1 (Academic Misconduct). The Code of conduct is available at https://www.lsu.edu/saa/students/codeofconduct.php.
- All assignments will be monitored against academic dishonesty. Examples of academic dishonesty include, but are not limited to:
  - Accessing the solution manual to the text and copying the solution before attempting the problem on your own, while attempting the problem on your own, or after checking your work and finding your solution to be incorrect.
  - Copying a problem solution from a classmate (be it one problem or the entire problem set). The copy may be identical or a rearranged version of another student.
  - Giving your completed problem set to another student who has not yet completed their problem set.
  - Copying a solution from another student verbatim.
  - Peeking at a problem solution without the knowledge of the spied upon student.
- All students, regardless of level of guilt, will be reviewed by SAA (Student Advocacy and Accountability) in the event that an academic misconduct violation is detected.
  - This is particularly important for those of you who "share" your homework with others. Many times this is done with the best of intentions to help a classmate, but the classmate may copy your solution and present the work as their own. The "sharer", in the eyes of the university, is just as guilty as the copier.
  - **Keep your work safe**. Never leave your homework with other students or send your solution to other students.
- If there is evidence of academic misconduct on laboratory assignments, programming projects, or exams, all involved parties will be submitted to SAA for review.

Communication Across the Curriculum (CxC)

This is a certified Communication-Intensive (C-I) course which meets all of the requirements set forth by LSU's Communication across the Curriculum program, including

- instruction and assignments emphasizing informal and formal [mode 1] and [mode 2];
- teaching of discipline-specific communication techniques;
- use of feedback loops for learning;
- 40% of the course grade rooted in communication-based work; and
- practice of ethical and professional work standards.

Students interested in pursuing the LSU Communicator Certificate and/or the LSU Distinguished Communicator Medal may use this C-I course for credit. For more information about this student recognition program, visit www.cxc.lsu.edu.

Class Project

- On project kickoff day, the instructor will provide a general problem domain within which the project must apply. The team will propose a specific problem within that domain to address.
- The class will be partitioned into teams of 4-5, based on diversity. The goal is to have teams of diverse individuals with respect to knowledge, experience, and cognitive preferences.
- While teams are expected to equitably divvy responsibilities among team members, all team members are required to implement systems programming concepts for the project solution. All team members are expected to make at least one in-class presentation.
- The team must select a leader that will take on the responsibility of coordinating the team efforts.
    - The team leader is expected to shoulder leadership responsibilities in addition to project responsibilities.
    - If the team leader provides good project leadership, they will get extra project points for their leadership efforts.
    - If the team leader fails to effectively lead the team, the team leader can lose project points.
    - The team may choose to change leadership for different Milestones, upon instructor approval.
- Project grades are calculated as follows:

$$P \times \sum_{i} (Weight_i \times Grade_i \times PercentContribution_i \times NumTeamMembers \times L_i)$$

    - Where $i \in$ {*Milestone 1, Milestone 2, Final Presentation, Post Mortem*}
        - $Weight_{Milestone\ 1} = 0.3$
        - $Weight_{Milestone\ 2} = 0.3$
        - $Weight_{Final\ Presentation} = 0.3$
        - $Weight_{Post\ Mortem} = 0.1$
    - $Grade_i$ is the grade awarded to the team project for Milestone *i*
    - $PercentContribution_i$ is the percentage that an individual team member contributed to the milestone. It is expected that every team member will contributed approximately the same amount to each milestone, but this factor corrects for the situation when contribution is not equitable within a team. This factor is determined by a survey of team members.
    - L_i is the leadership offset for Milestone *i* (either 1.15, 1.0, or 0.85)
    - *P* is the presentation factor:
        - 1, if the student provided an in-class presentation
        - 0.9, if the student did not provide an in-class presentation