CS 3100 – Operating Systems
Fall 2007 - Syllabus

Instructor: James Dean Mathias
Office: Old Main 437
Office Hours: MWF 1:00 p.m. – 2:20 p.m. (usually 8:30 a.m. to 9:30 a.m.)
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Prerequisite

CS 1410 & CS 2420 or equivalent coursework. This course assumes a basic comfort level with C++ programming.

Course Objectives

This course is intended to introduce the student to the fundamentals of operating system design and use. The following are specific objectives for this course:

- Mastery of the following OS design concepts
  - Kinds of Operating Systems & target hardware platforms
  - Computer System structures
  - High-Level Operating System structures
  - Process Management
    - Inter-process communication
    - Process scheduling
    - Process synchronization; semaphores, mutexes, critical sections
    - Classic problems of synchronization
    - Deadlocks
  - Multi-Threading
    - Models
    - Thread scheduling
    - Thread synchronization
  - CPU Scheduling
    - Criteria
    - Algorithms
    - Algorithm evaluation
  - Memory Management
    - Memory allocation
    - Paging
    - Segmentation
    - Virtual Memory
    - Demand Paging
    - Page replacement
  - File Systems, models and implementation
- I/O Systems
  - Hardware
  - Application Interface
  - Kernel sub-systems
  - Mass Storage Structure
- Mastery of the following OS programming techniques
  - make
  - Process creation
  - PThreads
  - Message Queues
  - Semaphores
  - Shared Memory
  - Dynamic Libraries


Assignments

All assignments are due by 11:59 p.m. of the due date and must be submitted using the Eagle grading system (eagle.cs.usu.edu). Late assignments will lose 25% for each day they are late. NO assignment will be accepted that is more than 3 days late.

The Linux Lab in Old Main 428 is available for this class. Additionally, you may choose to install a copy of Linux on your personal computer to complete the assignments for this class.

There will be approximately 8 assignments; this may change based upon how quickly we move through the course material. Each assignment is worth a maximum of 50 points. It is the responsibility of the student to convince the grader the assignment is complete and correct; don’t make the grader guess if your assignment is complete. The grader will be using the Old Main 428 Linux lab to test your programs, you should ensure your programs work on the computers in this lab before submission, they will be considered the standard base for questions regarding what platform they should correctly on.

Exams

There are two midterm exams and a final exam. The exams will cover the reading, lectures and programming assignments. The final exam is Wednesday, December 12th at 9:30 a.m., in the same room as the regularly scheduled lecture. The final is not given at any other time, do not ask to take it early or late, the answer is “No”.

Grading

- Programming Assignments 40%
- Midterm Exams 40% (20% each)
- Final Exam 20%
Once you have received your grade for an assignment or test, you have one week to challenge the grade. If I’ve made a mistake in grading your work, please do let me know; don’t be afraid to bring a grading issue up with me.

Final course grades will be curved based upon the overall class performance; however, you must receive at least 60% on the programming assignments and exams (60% on each of these two groups) in order to pass the class.

**Grading Standards**

Grading of assignments is based upon, at least, the following criteria:

- Completion of program features as outlined in the assignment description
- Format of output is pleasing and easy to understand. One should be able to understand the results by looking at them, in simple terms, this means that output should be labeled.
- Ability to handle error conditions (i.e. the program doesn’t crash)
- Code elegance and efficiency. Looking for things like good variable naming, use of functions, classes and other programming techniques.
- Commenting of code

Take care to ensure your assignment not only handles the assignment features, but that the program can gracefully handle error conditions. There is more to a well written program than producing correct output; you will be instructed regarding this as part of the course and expected to utilize these techniques in your work.

Work in this class is graded based upon providing the best solution rather than merely solving the problem. Sometimes students feel it is unfair for a teacher to expect the best when they are first learning; I believe it is important for a student to strive for the ultimate goal. In a professional environment, a program that “just works” is almost never adequate and will must be revised. In order to be prepared for the professional environment, you must practice those skills in advance.

**Grading Gift (get out of jail free card)**

Each student is allowed one late submission without penalty. The purpose of this (in my mind) is to deal with any problems that arise from errors in submission, missing files, etc. However, any reason is acceptable, in fact, I don't even need or necessarily want to know the reason.

The assignment must still be submitted to eagle within the late time frame for the assignment, which is 3 days for this class. You must notify me via email within one week of the assignment submission that you wish to use the “gift” on that assignment, no need to explain the reason. Once used, it is gone, any further late submissions are counted as late, regardless of the reason. You may not “post date” the use of this penalty at the end of the semester when you decide you need 5 extra points to get a different letter grade.

Do not burn this offer up early in the semester just because you feel a little lazy and want to turn one in late without penalty. Later in the semester, if you have a legitimate
submission problem or anything else, you will have wasted this opportunity to recover from a mistake without consequence.

**Course Account**

You will need to sign up for an account on the Eagle Grading System to be able to submit homework and see your grades. To do this go to Eagle's homepage at [http://eagle.cs.usu.edu](http://eagle.cs.usu.edu) and select **Create a New Account**. Before you can sign up for an account you will need to have a USU student email account (there is no charge for this service). If you do not yet have one, go to [https://barney.usu.edu/compserv/newuser.html](https://barney.usu.edu/compserv/newuser.html) to activate your account. Please get your USU email account ASAP; you cannot sign up for an eagle account without it.

When you sign up for an account, you will be assigned a user number. This user number will be sent to you via email. Please keep track of this user number. It will be used to login to the Eagle Grading System.

If you already have an Eagle account, you will need to logon to Eagle, select **Account** from the top menu and add this class to your account.

**Tutors**

There are CS tutors available for your use at no additional charge. They are available in the tutor labs, Main 425 and SER 005. I recommend that you use them.

**Cheating**

Submitting homework based in any way on the work of others is considered cheating. You should feel comfortable discussing the assignments and how you approached solving a problem, but you may not work together and submit code that is based on work by anyone else. This and all forms of cheating on exams are not tolerated. The CS Dept. policy on cheating is posted on the department web site.

Students must be officially registered for this course. Attending class beyond the last date to add without being officially registered is not allowed and will not be approved by the dean’s office. No assignments or tests of any kind will be graded for students whose names do not appear on the class list.

The dept. cheating policy can be found at: [http://digital.cs.usu.edu/cheating_policy.html](http://digital.cs.usu.edu/cheating_policy.html)

**Class Fee**

Associated with this class is a class fee of $25.00. The monies from this fee are used to maintain lab facilities for the class, purchase software and licenses, and supervise the lab. In some cases, students may have their own computing equipment, and thus feel that they do not need to use the lab. However, the lab must be maintained regardless of any individual's use of it, and thus the fee is charged to all registered for the class. If you have questions or concerns about the fee, please see the department head.
**ADA Compliance**
If a student has a disability that will likely require some accommodation by the instructor, the student must contact the instructor and document the disability through the Disability Resource Center, preferably during the first week of the course. Any requests for special considerations relating to attendance, pedagogy, taking of examinations, etc. must be discussed with and approved by the instructor. In cooperation with the Disability Resource Center, course materials can be provided in alternative formats, e.g. large print, audio, diskette, or Braille.

**Add & Drop Dates**
The last day to add this class is Monday, September 17\(^{th}\). Any student who adds late is still responsible for any homework assigned and due before that date, meaning, if any assignment due date has already passed, it can not be made up and a 0 will be counted. The university has a generous course drop schedule, it is as follows:

- Monday, September 17\(^{th}\) – without a “W” notation on your transcript
- Tuesday, October 25\(^{th}\) – with a “W” notation on your transcript
- Wednesday, November 9\(^{th}\) – with a “WF” notation on your transcript