Point Loma Nazarene University
CSC 314: Operating Systems (4 units)
Spring 2017

Instructor:

Dr. Lori Carter (619) 849-2352
loricarter@pointloma.edu office: RS 214

Office hours:

MWF 8:00-9:30, 1:00-2:00 TTh 10:45-11:45

Course Time and Location:

MWF 10:55-12:05 RS 14

Texts:

Silbershatz et.al, Operating System Concepts Essentials. Second ed. and Andersen, Paul, Just Enough Unix, Fifth ed. You will need both books right away!

Course Catalog Description:

A systems course focusing on operating systems, topics include basic operating system design, process management, device management, memory management, and file systems. Students are introduced to the basics of software evolution, reliability, concurrency, security and protection in the context of single-core, multi-core, distributed, and virtual environments. Class members gain experience using both GUI and command-line interfaces. In the course of implementing the CPU scheduling simulation, students understand the importance of thorough system testing and attention to system specs as they try to make parts of their systems work with those designed by their teammates.

Class Learning Outcomes

- Students will understand the interaction between hardware and software.
  - Students will be able to explain the purpose of the Operating System, and where it fits into the computer system as a whole
  - Students will be able to evaluate how a change in one part of the operating system will affect the operating system as a whole.
  - Students will develop a working knowledge of the UNIX/Linux operating systems
  - Students will be able to take from theory to design to implementation a module of an operating system.
- Students will have an understanding of the historical development, contemporary progress and societal role of computer science.
  - Students will be able to list the 5 tasks of the operating system, describe what each is, and justify why it is important.
- Students will be able to collaborate effectively in teams

Course Organization:

Lectures: Cover the highlights of chapters assigned – not a substitute for reading. Student versions of the lecture slides can be obtained from Canvas. These slides will contain homework assignments and due dates.

Friday activities: Frequently on Fridays, in lieu of homework, there will be some kind of in-class activity reviewing what was learned the previous week or 2. Each activity will be graded. It may be a quiz, it may be an essay question, it may be a group activity or some combination. Friday activities cannot be made up, however 1 will be dropped. If there is an exam in a particular week, there will not also be a Friday activity. You might find the homework problems at the back of each chapter helpful in preparing. You will definitely find the slides, lab questions, and text helpful!

Labs: Frequent labs based on the Linux operating system, from the book, *Just Enough Unix* and other sources will be assigned. Lab sessions are mandatory. Unless otherwise stated, labs are due by the beginning of the next class period after they were assigned. If the lab requires a demonstration, you will be given one opportunity to demonstrate it. It will either be signed off as correct, or I will make notes regarding what worked and what didn't. **No late labs are accepted** but I will drop the lowest lab grade. An unfinished lab may be turned in on time for partial credit. Labs will contain questions that require analysis and thought. Often, a large point value will be assigned to these answers. **They should be original, and in your own words**. If it appears that 2 (or more) people have turned in 1 lab, I will split the points or potentially each person a zero.

Exams: There will be 2 exams in addition to the final exam. These will only cover material presented since the last exam. If you will miss an exam for a school function, you must arrange to take it in advance. **If you ever miss an exam without giving me prior notice, there is a good chance you will receive a zero unless, of course, there was clearly an emergency.** Exam 1 is scheduled for **Feb. 15.** It will cover chapters 1 – 4 plus the appropriate chapters in the Unix book. Exam 2 is scheduled for **April 5** and will cover chapters 5-8 in your text. **Final Exam:** Cumulative exam with an emphasis on material covered in the last part of the semester. The final is scheduled for the **Wednesday of finals week at 10:30 PM**.

The **final exam date and time** is set by the university at the beginning of the semester and may not be changed by the instructor. Only in the case that a student is required to take three exams during the same day of finals week is an instructor authorized to change the exam date and time for that particular student.

Simulation Proje**ct:** A 3-week programming project based on process scheduling will be assigned. The entire project is due March 22, but there will be several intermediate due dates as well. In order to get full credit, all intermediate dates must be met as well as the final date. **Most aspects of this project (exceptions will be noted) must be completed using basic Linux/UNIX tools (non-GUI)**. Programs will be written in C++ using the basic Linux Operating System (command-line) and g++ compilers. All written projects will be completed using a Linux/Unix text editor. Nothing will be accepted after March 22.

Grading:

Friday activities	12%	Scheduling Project	10%
Exams	30%	Final	23%
Labs	25%		

Final grades will be determined as follows:

100-93%	A	80-82.9%	B-	67-69.9%	D+
90-92.9%	A-	77-79.9%	C+	63-66.9%	D
87-89.9%	B+	73-76.9%	C	60-62.9%	D-
83-86.9%	B	70-72.9%	C-	0-59.9%	F

University Mission:

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service becomes an expression of faith. Being of Wesleyan heritage, we aspire to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Department Mission:

The Mathematical, Information, and Computer Sciences department at Point Loma Nazarene University is committed to maintaining a curriculum that provides its students with the tools to be productive, the passion to continue learning, and Christian perspectives to provide a basis for making sound value judgments.

Attendance:

Attendance is expected at each class session. In the event of an absence you are responsible for the material covered in class and the assignments given that day. Regular and punctual attendance at all classes in which a student is registered is considered essential to optimum academic achievement. Therefore, regular attendance and participation in each course are minimal requirements to be met. There are no allowed or excused absences except as approved in writing by the Provost for specific students participating in certain university-sanctioned activities. Excused absences still count toward the 10%-20% limits, but allow students to make up work, quizzes, or tests missed as a result of a university-sanctioned activity. Activities of a unique nature, such as labs or other activities identified clearly on the

syllabus, cannot be made up except in rare instances when instructors have given advanced, written approval for doing so.

Whenever the number of accumulated absences in a class, for any cause, exceeds ten (10) percent of the total number of class meetings, the faculty member should send an e-mail to the student and the Vice Provost for Academic Administration (VPAA) warning of attendance jeopardy. If more than twenty (20) percent of the total number of class meetings is reported as missed, the faculty member or VPAA may initiate the student's de-enrollment from the course without further advanced notice to the student. If the date of de-enrollment is past the last date to withdraw from a class, the student will be assigned a grade of W or WF consistent with university policy in the Grading section of the catalog. There are no refunds for courses where a de-enrollment was processed. For more details see the PLNU catalog:
http://catalog.pointloma.edu/content.php?catoid=18&navoid=1278#Class_Attendance

Class Enrollment:

It is the student's responsibility to maintain his/her class schedule. Should the need arise to drop this course (personal emergencies, poor performance, etc.), the student has the responsibility to follow through (provided the drop date meets the stated calendar deadline established by the university), not the instructor. Simply ceasing to attend this course or failing to follow through to arrange for a change of registration (drop/add) may easily result in a grade of F on the official transcript.

Academic Accommodations:

While all students are expected to meet the minimum academic standards for completion of their courses as established by the instructors, students with special needs may require academic accommodations. At Point Loma Nazarene University, students requesting academic accommodations must file documentation with the Disability Resource Center (DRC), located in the Bond Academic Center. Students can also reach the Disability Resource Center by phone at 619-849-2486 or by e-mail at DRC@pointloma.edu. Once the student files documentation, the Disability Resource Center contacts the student's instructors and provides written recommendations for reasonable and appropriate accommodations to meet the individual needs of the student. This policy assists the university in its commitment to full compliance with Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities (ADA) Act of 1990, and ADA Amendments Act of 2008, all of which prohibit discrimination against students with special needs and guarantees all qualified students equal access to the benefits of PLNU programs and activities. For more details see the PLNU catalog:
http://catalog.pointloma.edu/content.php?catoid=18&navoid=1278#Academic_Accommodations

Students with learning disabilities who may need accommodations should discuss options with the instructor during the first two weeks of class.

Academic Honesty

Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Academic_Honesty for definitions of kinds of academic dishonesty and for further policy information.

Copyright Protected Materials:

Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

Credit Hours:

In the interest of providing sufficient time to accomplish the stated course learning outcomes, this class meets the PLNU credit hour policy for a 4 unit class delivered over 15 weeks. Specific details about how the class meets the credit hour requirements can be provided upon request.

Monday	Tues	Wednesday	Thurs	Friday
Syllabus 1.1-1.3 intro to OS and systems	Jan 10 Mon sched	11 1.4-1.10 OS structure and services	12	13 1.11-1.12 and Intro to Linux tutorial
16 MLK	17	18 Unix ch 6, Unix file system: Linux lab 2 (unix book)	19	20 Friday activity OS 2.1-2.3 OS interfaces, C lab (Unix book)
23 C quiz for lab grade Systems calls: OS chapt 2.4-2.5 Systems calls lab	24	25 OS chapt 2.6-2.10: OS design and implementation	26	27 Friday activity chapter 2 Lab: Emacs & C++ (Unix book)
30 OS Chapter 3.1-3.4 – introduction to processes	31	Feb 1 OS chapter 3.5-3.6 inter-process communication Unix scripting	2	3 Unix scripting lab (unix book)
6 OS chapter 4 - threads	7	8 Finish threads Threading lab 1	9	10 Friday activity chapters 3, 4 Threading lab 2
13 Discuss lab results, exam review	14	15 Exam 1 (OS and Unix)	16	17 OS 5.1-2, concurrency lab
20 OS 5.3-5.6 solutions to critical section problem	21	22 OS 5.11 deadlock	23	24 Friday activity chapter 5 OS chapter 6.1-6.3.2: Intro to CPU scheduling
27 Introduce scheduling project & makefiles, makefile lab (unix book)	28	Mar 1 SJF test cases due	2	3 Makefile driver testing
6 Sp break	7	8 Sp break	9	10 Sp break
13 OS 6.3-6.4 Preemptive scheduling algorithms	14	15 6.5 Multi-processor scheduling Test SJF module	16	17 Preemptive test cases due 6.6-6.7 Real time and real system scheduling
20 OS chapter 7.1-7.4 Memory management	21	22 More memory management Test SJR module	23	24 Friday activity chapter 7 so far; 7.5-7.6 paging
27 OS chapter 8.1-8.4 Demand paging	28	29 OS 8.5-8.8 Memory allocation	30	31 Finish chapter 8
Apr. 3 Review	4	5 Exam 2	6	7 OS chapter 9.1-9.4 Mass storage management
10 OS 9.5-9.8 Disk management	11	12 OS Chapter 10: File Systems	13 Easter	14 Easter
17 Easter	18	19 OS: chapter 11.1-11.4: File allocation	20	21 Friday activity chapters 9-10 OS: 11.4-11.5 Free space management
24 OS 12: IO system basics	25	26 OS 13,14 Protection and Security basics	27	28 review
May 1	2	3 10:30 CSC 314 final	4	5