Point Loma Nazarene University
CSC 3014: Operating Systems (4 units)
Spring 2020

Instructor:

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Office hours: TR 8:30-9:30, 11:00 – 12:15. Most Wednesdays 9:00-2:00

Course Time and Location: TR 12:30-2:15 LA 101

Texts and other supplies:

Silbershatz et.al, Operating System Concepts Essentials. Second ed. and Andersen, Paul, Just Enough Unix, Fifth ed. You will need both books right away! Please bring your laptop to every class session. Please talk to me immediately if you do not have a laptop.

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 state how ethics plays a role in OS development
- Students will be able to collaborate effectively in teams

Course Organization:

Lecture sessions:

Our time together in class will be composed of formal lectures, short problems sets on which you can work with peers, quizzes, and lab times. The formal lectures will cover the highlights of chapters assigned and are not a substitute for reading. Student versions of the lecture slides can be obtained from Canvas. To prepare for lectures that start new chapters, you will be required to **submit a 3-sentence (not 2 or 4) summary of the introduction** of the chapter **in your own words**. Each summary is due before midnight on the day before the lecture starting a new chapter. Each is worth 5 points based on how well you capture the essence of the chapter introduction. One summary can be dropped.

Quizzes: Most weeks you will be given a quiz on the material that we have covered since the last quiz. On the class session before the quiz, I will provide the information on what the quiz will cover. Quizzes cannot be made up, however 1 will be dropped. You may use any **strictly** hand-written notes (written by you) during the quiz.

Labs: Frequent labs based on the Linux/Unix operating systems, from the book, *Just Enough Unix* and other sources will be assigned. Most labs will be started during class. **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 when this is not authorized, I will split the points or potentially give 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 a documented emergency.** Exam 1 is scheduled for **Feb. 20.** It will cover chapters 1 – 4 plus the appropriate chapters in the Unix book. Exam 2 is scheduled for **April 14** 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 **Thursday of finals week at 1:30 PM**.

Simulation Project: A 3-week programming project based on process scheduling will be assigned. The entire project is due March 24, 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. Unless otherwise stated, late portions are not accepted. **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.

Grading:

Quizzes	10%	Labs	25%
Chapter intros	5%	Scheduling Project	10%
Exams	30%	Final	20%

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 is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Class_Attendance in the Undergraduate Academic Catalog.

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 standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center. (DRC@pointloma.edu or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan (AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 (a) prohibits discrimination against students with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses.

If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

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.

Final Exam: Date and Time:

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. This schedule can be found on the university website and in the course calendar. No requests for early examinations will be approved. 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 consider changing the exam date and time for that particular student.

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.

CSC 3014 Expected Schedule Spring 2020

Mon	Tues	Wed	Thurs	Fri
	14	15	16 Syllabus, overview of computer system, binary, 1.4,1.6-1.9 evolution of OS, basic services categories of OS	17
20 MLK	21 1.11-1.12 Unix lab 1, Unix file system	22	23 Quiz on binary, basics of computer system. OS 2.1-2.3, start C lab	24
27 mlk	28 C lab due Lecture on system calls including forks, start system calls lab. OS chapter 2.4-2.5, 2.6-2.10	29	30 Quiz on C and system calls Lab on Emacs and C++	31
Feb 3	4 OS Chapter 3.1-3.3 intro to processes, UNIX shells lab	5	6 Quiz on shells, unix commands 3.4-3.6 interprocess communication OS scripting lab	Feb 1
10	11 OS chapter 4 – threads, priorities Threading lab	12	13 Makefile lab	14
17	18 Discuss threading lab IOS and Android threads as part of review Open Source vs. Proprietary ethics	19	20 Exam 1 (OS and UNIX)	21
24	25 OS chapter 5.1-5.2 concurrency. concurrency lab OS 5.5-5.6 critical section	26	27 5.11 deadlock OS 6.1-6.3.2 intro to CPU scheduling, intro project: Assign stubbs/driver	28
Mar 2	3 FCFS test cases due Discuss FCFS algorithm	4	5 Test stubbs/driver Work on FCFS module	6
9	10 Sp break	11 SIGCSE	12 Sp break SIGCSE	13
16	17 FCFS module due Present SJF, priority	18	19 SJF test cases due present RR and SJR 6.3-6.4	20
23	24 SJF module due with analysis questions completed in class Hospitality ethics 6.5-6.7 multiprocessor algorithms	25	26 Quiz on RR and SJR 7.1-7.4 memory management	27
30	31 7.5-7.6 paging 8.1-8.4 start virtual memory	Apr 1	2 Quiz on paging Finish chapter 8 8.5…	3
6	7 Discussion of questions related to mobile devices on scheduling, memory management Review for exam (above is part of review)	8	9 Easter	10
13	14 Exam 2	15	16 Chapter 9 mass storage, disk management Transparency module	17
20	21 Chapter 10 File systems 11.1-11.4 file allocation	22	23 Quiz on file allocation methods Discuss free space management 11.4-11.5	24
27	28 I/O system basics ch 12	29	30 Protection and security basics ch 13,14	May 1
4	5	May 6	7 Final (1:30)	8