CS 283 Systems Programming Syllabus

Course Description

This course introduces computer systems, including interaction of hardware and software through the operating system, from the programmer's perspective. Three fundamental abstractions are emphasized; processes, virtual memory, and files. These abstractions provide programmers a common interface to a wide variety of hardware devices. Topics covered include linking, system level I/O, concurrent programming, and network programming.

Course Objective and Goals

1. To obtain practical skills in concurrency and multithreaded programming.
2. To become familiar with and comfortable using the programming facilities of the operating system, including a) File system structures, b) Network / socket programming, c) Memory system and shared memory, d) Thread mechanisms, and e) I/O system structures.
3. To operate in and self-manage in programming teams.

Audience and Purpose within Plan of Study

This is a core computer science course required by all Computer Science majors. It should be taken in the 3rd year. This course is appropriate for students interested in modern computer architecture, computer systems and high performance computing.

Prerequisites

CS 265

Instructor

Constantine Katsinis (katsinis@drexel.edu)
Office Hours: Monday 3-5 pm in UC 114

Meeting Time

283-1	Monday	1800	2050
283-2	Thursday	1830	2120
283-3	Tuesday	1830	2120
283-4	Tuesday	1530	1650
	Thursday	1530	1650

Teaching Assistants

	Office Hours		
	Day	Start	End
Paras Wadekar psw36@drexel.edu	Tuesday	10:00 AM	12:00 PM
	Wednesday	12:00 PM	2:00 PM
Vishnu Sreenivasan vs444@drexel.edu	Thursday	4:00 PM	6:00 PM

What Students Should Know Prior to this Course

1. Programming constructs and data structures in C and/or C++.
2. Effectively use of the Unix programming environment - shell, file system, scripts, pipes, regular expressions, filters, program development tools
3. Use of effective procedures and tools for building, debugging, testing, tuning, and maintaining programs

What Students will be able to do upon Successfully Completing this Course Statement of Expected Learning

1. Use, develop and become familiar with programming constructs that interface with the operating system to provide functionality to the programmer and the user
2. Write portable systems-level applications
3. Coordinate threads using shared memory and distributed message-passing on a variety of platforms

Textbook

1. Randel Bryant and David O'Hallaron. Computer Systems: A Programmer's Perspective, 3rd Edition. Prentice Hall: 9780134092669
2. Recommended: W. Richard Stevens and Stephen A. Rago. Advanced Programming in the UNIX Environment, 2nd Edition. Addison Wesley: 0201433079
3. Recommended: Michael Kerrisk. The Linux Programming Interface. No Starch Press: 9781592372203

Topics

1. Concurrency (Chapter 12)
2. Process and Thread Management
3. Process Tables (Chapter 8)
4. Compilers, Linkers and Loaders (Chapter 7)
5. Memory Systems (Chapters 6, 9)
6. File Systems (Chapter 10)
7. Network Programming (Chapter 11)

Grading and Policies

- Homework and Programming Assignments 35%
- Labs 15%
- Midterm Exam 20%
- Final Exam 20%
- Project 10%

Final grades

- A range (A+, A, A-) is a course average [90, 100)
- B range is a course average [80, 90)
- C range is a course average [70, 80)
- D range is a course average [60, 70)
- F range is a course average [0, 60)

Academic Honesty Policy

The university's Academic Honesty policy is in effect for this course. Please read Drexel University Student Handbook found at http://www.drexel.edu/Studentlife/. On the first incident, students who share their work (even with best intentions) or otherwise violate the course or university academic honesty policy may receive a grade of F for the course (the students may not withdraw in this case). The students may be reported to the department, college, and/or University Judicial (Honesty) Board. Both the giver and the receiver will receive these penalties.

Submitting Assignments

- All assignments must be submitted using only BBLearn.
- All assignments must be submitted no later than the due date and time listed on the Course Schedule shown in the table below.
- No late assignments will be accepted.
- Grade breakdowns, rubrics, and/or point valuations are provided on each assignment.
- Grades will be reported via BBLearn.

Holidays

Please note the following holidays. If we have class normally scheduled on these days, we will not meet.

- Monday, January 16, 2017, Martin Luther King, Jr. Day

Tentative Course Schedule

Wk	Week of	Lecture Topics	Readings	Notes
1	1/09/2017	Intro to C Programming with gcc		
2	1/16/2017	Make, GDB and Valgrind		
3	1/23/2017	File I/O	CSAPP Ch. 10	
4	1/30/2017	File I/O	CSAPP Ch. 10	
5	2/06/2017	Network Programming	CSAPP Ch. 11	
6	2/13/2017	Concurrency	CSAPP Ch. 12 pthreads tutorial	Midt
7	2/20/2017	Concurrency Process Management and Signals	CSAPP Ch. 12 CSAPP Ch. 8	
8	2/27/2017	Process Management and Signals Writing a Shell Interprocess Communication	CSAPP Ch. 8	
9	3/06/2017	Writing a Shell Interprocess Communication Compiling, Linking and Loading	CSAPP Ch. 7	
10	3/13/2017	Memory and Cache	CSAPP Ch. 6 CSAPP Ch. 9	
11	3/20/2017			Fin

Assignment Deadlines

Homework	**Report due at 6 pm**
H1: Practice Problems in C	02/03/2017
H2: Problems Ch. 10(6+8+10)+more	02/10/2017
H3: Problems Ch. 11(6+7+9)	02/17/2017
H4: File I/O	02/24/2017
H5: Problems Ch. 12(16+17)+more	03/03/2017
H6: Problems Ch. 8(11+12+13+14+16+23)	03/10/2017
H7: Problems Ch. 7(6+7+9)	03/17/2017
EVAL	03/18/2017
Labs	**Report due at 6 pm**
L1: svn Repository	01/20/2017
L2: Make, GDB and Valgrind	01/27/2017
L3: File I/O Programming	02/10/2017
L4: HTTP Client and Server	02/24/2017
L5: Concurrent Programming	03/03/2017
Project	**Report due at 6 pm**
P1: Project Preliminary Report	03/03/2017
P1: Project Final Report	03/17/2017

University Policies

In addition to the course policies listed on this syllabus, course assignments or course website, the following University policies are in effect:

- Academic Honesty:
  - http://www.drexel.edu/provost/policies/academic_dishonesty.asp
- Student Life Honesty Policy from Judicial Affairs:
  - http://www.drexel.edu/studentlife/judicial/honesty.html
- Students with Disability Statement:
  - http://www.drexel.edu/ods/student_reg.html
- Course Add/Drop Policy:
  - http://drexel.edu/provost/policies/course-add-drop/
- Withdrawal:
  - http://drexel.edu/provost/policies/course-withdrawal/
- The instructor may, at his/her/their discretion, change any part of the course during the term, including assignments, grade breakdowns, due-dates, and the schedule. Such changes will be communicated to students via the course web site Announcements page in BBLearn. This page should be checked regularly and frequently for such changes and announcements. Other announcements, although rare, may include class cancellations and other urgent announcements.
- Drexel Student Learning Priorities:
  - http://www.drexel.edu/provost/dcae/SymposiumLearningPriorities.PDF