California State University, Sacramento
College of Engineering and Computer Science

Computer Science 60:
Introduction to System Programming in UNIX.

Spring 2021 Syllabus

Instructor and Contact Information

Ms. Ruthann Biel, M.S. in Computer Science, Sac State.

E-Mail	bielra@gmail.com, bielr@csus.edu *(The csus email is forwarded to the gmail acct.)*
Home Phone	(916) 381-4205
Office Hours:	Virtual via Zoom till May 14. M-W 10:00 am – 11:30 am M-W 2:00 pm – 2:45 pm T-Th 10:30 am – 11:30 am
Computer Science office	Pruitt, Veronica E, vpruitt@csus.edu For advising: Link to CSC Dept Advising

My Class Times:

CSC60-04	32520	M-W	12:00pm - 1:15pm
CSC60-01	32362	M-W	3:00 pm - 4:15 pm
CSC60-05	32580	T-Th	9:00 am - 10:15 pm
CSC60-03	32727	T-Th	12:00pm - 1:15pm
CSC60-02	32467	T-Th	3:00 pm - 4:15 pm

Final Exams: Link to Final Exam Schedule

CSC60, Sec 1	May 17, Mon	3:00pm - 5:00pm
CSC60, Sec 5	May 18, Tue	10:15am - 12:15pm
CSC60, Sec 3	May 18, Tue	12:45pm - 2:45pm
CSC60, Sec 4	May 19, Wed	10:15am - 12:15pm
CSC60, Sec 2	May 19, Wed	3:00pm - 5:00pm

DATES FOR THIS SEMESTER. Link to Academic Calendar

Feb 19, 2021	Census Date. Last day to drop without it showing on transcript
Feb 26, 2021, Friday	Engineering & Computer Science Virtual Career Fair
Mar 22-25, 2021	Spring Break
Mar 31, 2021	Cesar Chavez Day, Wed.
Apr 23, 2021	Last day to withdraw from class
May 11, 2021	Last day of instruction
May 17-21	Final's week
May 26, 2021	Grades Due

TEXTBOOK & COURSE MATERIALS

- All books are available in PDF on Canvas.
- **Required Textbook**: The Linux Programming Interface: A Linux and UNIX System Programming Handbook, by Michael Kerrisk.
- **Recommended Text: by** Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language (ANSI C), Second Edition, Pearson/Prentice Hall, 1988.
- **Recommended Text:** John Shapley Gray, Interprocess Communication in Linux: Nooks & Crannies, 2008. (Optional but great for the devoted. Not in bookstore.)

GENERAL: SOFTWARE & HARDWARE

We will do class/lab work using an open-source free compiler in a UNIX environment. We will access the ECS computer "athena". We also will be able to log into campus from home to do class work.

COURSE DESCRIPTION

Prerequisite: Required satisfactory completion of CSC 20 **and** CSC 35 or their equivalents.

Features of the C language commonly used in systems programming, application to systems programming in a UNIX environment. Topics include C preprocessor macros, I/O, bit-manipulation facilities, timesharing system concepts, file permissions, shell script programming, make files and source code control, basic system calls like fork and exec, pointers and dynamic memory allocation, libraries and relocation and linking concepts including assembler handling of symbol tables. Prior knowledge of a C like programming language is presumed.

TOPIC OUTLINE/SCHEDULE

Brief List of Topics:

1. UNIX file system
2. C functions, variables, operators, and expressions
3. Pointers.
4. Standard IO and system-level IO, string handling
5. Dynamic memory management.

6. C preprocessor.
7. Make facility.
8. Static and Dynamic libraries
9. System calls, error handling and recovery.
10. Debugger.
11. Source code control.
12. Signals.
13. Multiprogramming in UNIX, process creation and termination.
14. Pipes.
15. Message queues.
16. Semaphores.
17. Shared memory.
18. Sockets.
19. Remote procedure calls.
20. POSIX threads.

TOPICS COVERED

Students completing this course will be able to
1. Write well-structured, procedurally oriented programs in C,
2. Use a multi-user, time-sharing operating system – Linux
3. Write systems programs in the Linux environment.
4. Understand principles of concurrency
5. Demonstrate the ability to develop a Linux mini-shell application
6. Understand and apply synchronization mechanisms to the critical section problem

Course Requirements: Internet connection (DSL, LAN, or cable connection)

HOW TO DO WELL IN THIS CLASS

- Attend class !!!!!!!!
- After class, go over the slides again, and come back with questions if you have them.
- Do the homework!!!!!!
- Keep up with the reading list at the end of the syllabus.
- Do not be afraid to ask questions, either in class, or during office hours.
- If you are struggling with a topic, take steps early to address the problem. Visit the instructor, the free tutoring, or other help.

ATTENDANCE

You must take the mid-term and the final at the scheduled time unless you have a good reason. If you cannot attend the mid-term or the final for any reason, you are expected to arrange with me **in advance**. Either:

- Discuss your situation with me.
- Call me at home (916-381-4205)
- Send me email at bielra@gmail.com or bielr@csus.edu

Class attendance will be considered in your grade. I will take attendance by looking at the list of people who are present for the live class on Zoom. If that does not work for you, consult with me about an alternative. If you miss a class, you are responsible for knowing all the material that has been covered in class. (Check the Weekly Summaries on Canvas). In addition, you are responsible for knowing any important information announced in class; such information includes (but is not confined to) the date of the mid-term, what material will be covered on the mid-term and on the final exam. In short, absence from class is no excuse for failure to know any material or for not knowing when a mid-term is given. I will post test dates and other material on Canvas.

- If you notify me of illness, especially of Covid-19, I will show great flexibility in dealing with you.
- If you wish to watch a class session that you are not registered for, you must contact me to add you to the list for that class. (The various class sections progress independently and are often at different places of instruction.)

BASIS OF GRADE

The date of the mid-term is mentioned with an approximate date in this handout. This handout does not list the material to be covered on the mid-term and on the final exam. I will announce the mid-term's date in class at least a week in advance. (It usually is the eighth week, after I take a poll of who has exams and when.) The material to be covered on the mid-term and on the final will also be announced in class, and a Study Guide will be provided. I will not give incompletes under ordinary circumstances.

Your grade will **approximate** the following scheme.

Class Attendance & Participation	5%
Assignments & Lab Work	45%
Exams:	
Mid-Term	20%
Final	30%

My assignment of grades:

95-100	= A	
90-94	= A-	
87-89	= B+	Follow the pattern of B-/B/B+
84-86	= B	for grades in the seventies or below.
80-83	= B-	

BEHAVIOR IN THIS CLASS

- No Cheating. Although you may engage in general discussions with other students, you are expected to write your own programs. The word "general" implies that the discussions are not at the level of detail of C statements. "Taking someone else's program, copying it, and putting your name on it" is considered cheating. Loaning the program makes you part of the deception. The Computer Science Dept. policy on cheating is at: http://www.ecs.csus.edu/wcm/cpe/pdfs/Academic%20Integrity%20Form.pdf
- We will be using ZOOM, a live on-line class. It is described in the catalog as a Discussion. That means I need you to interact, make comments, ask questions, so it is not just me droning on with Power Point.
- I would be grateful if you would fix your Zoom so it shows a picture of you, if you don't want to do live video. I will miss your live presences. (On your computer, bring up Zoom (without Canvas or live class). In the upper right corner, there should be a settings button. (Mine shows my picture.) Right Click, then find and click on My Profile on the drop-down menu. To the left of your name, there is a place to upload your picture, and later change or delete it.)
- Behavior on campus and in class in general. Hornet Honor Code

RULES CONCERNING PROGRAMS

One of the first lines of each program will be a Comment with your name.
The next line of each program will be a Comment with the assignment name.
(Example: Lab 2, or Program 3).
You will submit programs to Canvas, following the explicit directions given for each assignment.
Each program will be graded according to several criteria:

- Does the program produce the correct output?
- Were all required techniques used?
- Were all required comments included?

DROP INFORMATION

- Change of schedule with signatures is Feb 19, Census Date. Census date is the last date to drop class without receiving a "W"
- The withdrawal deadline is the last date for the course to appear in the transcript as a W. W does not affect GPA.
- It is ***your*** responsibility to ensure that your idea of your class schedule agrees with the on-line version.
- If you just disappear in the middle of the semester without withdrawing properly, I am required to assign you a grade of "WU" which then converts to an "F" on your transcript. If you have major problems in your life, I may be able to work with you to finish this class, but only if you talk with me about arrangements. https://www.csus.edu/indiv/l/lundp/drop.htm

INFORMATION ON ASSIGNMENTS & TESTS

Assignments will be discussed in class and posted on Canvas.
Tests, **the midterm and the final**, will be open book and open note. Sharing with classmates will not be allowed during a test. No compilers will be allowed either. If you forget a detail during a test and want to look it up, that is rather like a real-life situation. If you expect to look it ALL up, I can tell you students before you have tried that, and they have gotten test grades of about 50%. There will not be enough time to learn it and/or look it all up during the test period. The test will be on Canvas and administered during class time, in conjunction with a Zoom session where you can ask questions.

Tests will be on Canvas and administered during class time, in conjunction with a Zoom session where you can ask questions via Chat.

STUDENTS WITH DISABILITIES

If you have a disability and require accommodations, you need to provide disability documentation to SSWD (Services to Students with Disabilities), Lassen Hall 1008, (916) 278-6955, or https://www.csus.edu/student-affairs/centers-programs/services-students-disabilities/
Please discuss your accommodation needs with me after class or via email **early** in the semester.

THE UNIVERSITY READING AND WRITING CENTER

For free, one-on-one help with reading or writing in any class, visit the University Reading and Writing Center (URWC). The URWC can help you at any stage in your reading and writing processes: coming up with a topic, developing and organizing a draft, understanding difficult texts, or developing strategies to become a better editor. Visit their web site (below) to find out how they are working virtually.
https://www.csus.edu/undergraduate-studies/writing-program/reading-writing-center.html.

Support for BASIC NEEDS and HEALTH

If you are experiencing challenges in the area of food and/or stable housing, help is just a click, email or phone call away! Sacramento State offers basic needs support for students who are experiencing challenges in these areas. Please visit our Basic Needs website to learn more about your options and resources available.

- CARES. Crisis Assistance & Resource Education Support. https://www.csus.edu/student-affairs/crisis-assistance-resource-education-support/
- Health. Student Health and Counseling Services
    - Please do not go on campus if you are sick…unless you have an appointment at the Health Center.
    - If you suspect Covid, visit the above health center links for current information.
- Disabilities. https://www.csus.edu/student-affairs/centers-programs/services-students-disabilities/

TENTATIVE SCHEDULE

It is your job to check in with this schedule and keep up with the reading!

Tentative Schedule: Week	C Programming Language Topics	Unix Topics
1	C Types, operators & expressions (KR Chapter 2)	Introduction: History (LPI Chapter 1), Introduction: Login, Basic commands
2	Control structures, The C preprocessor, Program structure (KR Chapters 3, 4)	Basic commands (Cont), Programming Tools: Editor, Compiler, Debugger, Source Code Control, Make Utilities
3	Basic I/O, functions (KR Chapters 4, 7)	I/O (LPI Chapters 4, 5), Redirection
4	Arrays, pointers, structures (KR Chapter 5)	Shared library (LPI Chapters 40, 41)
6	Advanced I/O	Unix file system
7	Function pointers (KR Chapter 5)	Unix shell programming
8	Systems programming (LPI Chapter 3)	
9 Midterm subject to change of week →	*****Midterm Exam *****	*****Midterm Exam *****
10	Processes & Multiprogramming (LPI Chapters 6, 24, 25, 26)	
11	Signals, pipes (LPI Chapters 20, 21, 22)	
12	Semaphores, shared memory (LPI Chapters 45, 46, 47, 48)	
13	Message queues, sockets, Threads (LPI Chapters 56, 57, 58)	
14	Remote procedure calls (LPI Chapters 56, 57, 58)	
15	Review	Review
16	***** Final Exam *****	***** Final Exam *****