CS 525 Systems Programming

Schaefer School of Engineering & Science

Spring 2023

Instructor: Debbie Reid
Course Web Address: https://sit.instructure.com
Course Schedule: Monday - Sunday
Contact Info: dreid@stevens.edu
Virtual Office Hours: Monday, Tuesday, Wednesday, Thursday: 5:00pm - 6:30pm
Virtual Live Sessions: Use the Zoom link in the course menu to access live session info
Prerequisite(s): Introduction to Operating Systems – CS 520
Corequisite(s): None
Credits: 3

COURSE DESCRIPTION

In this course, students will learn to develop system-level software in the C programming language while gaining an understanding of the UNIX family of operating systems and their programming environment. Topics covered will include the user/kernel interface, fundamental concepts of UNIX, user authentication, basic and advanced I/O, file systems, signals, process relationships, and interprocess communication. Fundamental concepts of software development and maintenance on UNIX systems (development and debugging tools) will also be covered.

STUDENT LEARNING OUTCOMES

After successful completion of this course, students will be able to…
- Create efficient C programs on the Linux platform.
- Allocate and free memory correctly and safely.
- Apply debuggers, version control, and automation tools for application development.
- Execute Linux commands and processes via command line, scripts or GUI-based applications.
- Recognize and execute process, signal, and socket system calls.
- Develop and utilize applications through streams, buffers, pipes, files, and devices.
- Link standard, shared, and generated libraries to applications.

COURSE FORMAT AND STRUCTURE

This course is fully online. To access the course, please visit stevens.edu/canvas . For more information about course access or support, contact the Technology Resource and Assistance Center (TRAC) by calling 201-216-5500.

Course Logistics

- You are encouraged to "mentally enroll" in this course as if it occurred on Mondays. In other words, each module will run from Monday to Sunday.
- Challenge Activities and Programming assignments are due every Sunday by 11:59 pm ET.
- Multiple choice quizzes will be given at the end of each module.
- Course requirements must be completed and posted or submitted on or before specified due date and delivery time deadline. Due dates and delivery time deadlines are defined as Eastern Time (as used in Hoboken, NJ). Please note, students living in distance time zones or overseas must comply with this course time and time and due date deadline policy. Avoid any inclination to procrastinate. To encourage you to stay on schedule, due dates have been established for each assignment; 20% of the total points will be deducted for assignments received at most 2 days late; assignments received more than 2 days late will receive 0 points.
- Each module contains a discussion board. In these boards, you can ask questions about topics pertaining to that module. Do not post code solutions in the discussion boards unless specifically requested by your instructor. Your instructor will use this board to guide discussions during the live session.

Instructor's Online Hours

Virtual Office Hours will be held via synchronous Zoom sessions to discuss questions related to weekly readings and/or assignments. The link for the Office Hours Meetings will be posted in the Canvas Module (Virtual Office Hours).

TENTATIVE COURSE SCHEDULE

This course is set up based on content acquisition throughout the weeks. Unlike other courses, one module does not equate to one week. During some weeks, you will cover several modules. Please ensure you keep in mind the dates associated with each of the modules in order to complete the assignments, quizzes, and expectations by the due dates. Assignments posted in one module may be associated with more than one module as well.

Note: All assignments are due on the last day for each module.

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Week or Module	Topic(s)	Readings	Assignment
1	Introduction to C Programming Variables and Assignments	Required: zyBooks Module 1 zyBooks Module 2	Weekly Quiz in Canvas
2	Branches Loops	zyBooks Module 3 zyBooks Module 4	Weekly Quiz in Canvas Project 1
3	Arrays User-defined Functions	zyBooks Module 5 zyBooks Module 6	Weekly Quiz in Canvas

4	Structs Pointers	zyBooks Module 7 zyBooks Module 8	Weekly Quiz in Canvas Project 2
5	Recursion Sorting and Searching Algorithms	zyBooks Module 10 zyBooks Module 11	Weekly Quiz in Canvas
6	Input and Output	zyBooks Module 9 Stevens & Rago Textbook chapter 3, 14	Weekly Quiz in Canvas Project 3
7	Files and Directories	Stevens & Rago Textbook chapter 4	Weekly Quiz in Canvas Linux Challenge Activity
8	Shell Scripting	Linux Shell Scripting for Beginners videos by Udemy* (41:57) and Linux Shell Scripting Tutorial by Edureka** (1:15)	Weekly Quiz in Canvas Project 4
9	Processes	Stevens & Rago Textbook chapters 7 - 8	Weekly Quiz in Canvas Linux Challenge Activity
10	Signals	Stevens & Rago Textbook chapter 9 - 10	Weekly Quiz in Canvas Project 5
11	Pipes	Stevens & Rago Textbook chapter 15	Weekly Quiz in Canvas Linux Challenge Activity
12	Sockets	Stevens & Rago Textbook chapter 16	Weekly Quiz in Canvas Project 6
13	Libraries	Stevens & Rago Textbook chapters 5, 6, 20	Weekly Quiz in Canvas Linux Challenge Activity

COURSE MATERIALS

Textbook(s):
    zyBook *Programming in C* Online ebook, practice activities,
    challenge activities) - the link for purchase is provided in the Canvas course.

    Advanced Programming in the UNIX Environment, by Stevens and Rago, 3rd
    Edition, ISBN: 978-0-321-63773-4

COURSE REQUIREMENTS

zyBooks Participation and Challenge Activities: Modules 1 - 6 contain challenge activities from zyBooks. (15%)

Linux Challenge Activities: Modules 7, 9, 11, and 13 will contain challenge activities in Linux based on the textbook readings. (15%)

Module Quizzes: There will be a multiple-choice quiz at the end of each module of the course. (20%)

Programming Assignments: There will be 6 programming assignments that will be submitted in zyBooks and Canvas. (30%)

Live Session Participation: During each live session students will work in small groups to solve problem(s) and conference as a class. (10%)

Final Exam: Cumulative exam at the end of the course. (10%)

GUIDELINES FOR DISCUSSIONS

The discussion area in each module will be used as a mechanism to post general questions, discuss areas you are struggling with, or where you just need clarification on a concept that doesn't fit in a specific module.

Do not post your code or solutions here but do ask questions...and if you can answer someone's post please do so. I will monitor this board to be sure the responses are accurate and provide clarification as needed. This board will also be a guide to the areas we need to spend more time on during the live sessions.

TECHNOLOGY REQUIREMENTS

Baseline technical skills necessary for online courses
- Basic computer and web-browsing skills
- Navigating Canvas

Technology skills necessary for this specific course
- Live web conferencing using Canvas Zoom

Required Equipment
- Computer: Linux Ubuntu with high-speed internet connection
- Webcam: built-in or external webcam, fully installed
- Microphone: built-in laptop or tablet mic or external microphone

Required Software
- Microsoft Word

GRADING PROCEDURES

Grades will be based on:

zyBook Participation and Challenge Activities	15%
Linux Challenge Activities	15%

Programming Projects (6)	30%
Module Quizzes (1 per module)	20%
Live Session Attendance and Participation	10%
Final Exam	10%

Late Policy

20% of the total points will be deducted for assignments received 1-2 days late; assignments received more than 2 days late will receive 0 points.

There are no makeups for quizzes but your lowest score will be dropped.

Academic Integrity

Graduate Student Code of Academic Integrity

All Stevens graduate students promise to be fully truthful and avoid dishonesty, fraud, misrepresentation, and deceit of any type in relation to their academic work. A student's submission of work for academic credit indicates that the work is the student's own. All outside assistance must be acknowledged. Any student who violates this code or who knowingly assists another student in violating this code shall be subject to discipline.

All graduate students are bound to the Graduate Student Code of Academic Integrity by enrollment in graduate coursework at Stevens. It is the responsibility of each graduate student to understand and adhere to the Graduate Student Code of Academic Integrity. More information including types of violations, the process for handling perceived violations, and types of sanctions can be found at www.stevens.edu/provost/graduate-academics.

Special Provisions for Undergraduate Students in 500-level Courses

The general provisions of the Stevens Honor System do not apply fully to graduate courses, 500 level or otherwise. Any student who wishes to report an undergraduate for a violation in a 500-level course shall submit the report to the Honor Board following the protocol for undergraduate courses, and an investigation will be conducted following the same process for an appeal on false accusation described in Section 8.04 of the Bylaws of the Honor System. Any student who wishes to report a graduate student may submit the report to the Dean of Graduate Academics or to the Honor Board, who will refer the report to the Dean. The Honor Board Chairman will give the Dean of Graduate Academics weekly updates on the progress of any casework relating to 500-level courses. For more information about the scope, penalties, and procedures pertaining to undergraduate students in 500-level courses, see Section 9 of the Bylaws of the Honor System document, located on the Honor Board website.

EXAM CONDITIONS

The following procedures apply to quizzes and exams for this course. As the instructor, I reserve the right to modify any conditions set forth below by printing revised Exam Conditions on the quiz or exam.

1. Students may use the following materials during quizzes and/or exams. Any materials that are not mentioned in the list below are not permitted.

Material	Permitted?	
	Yes	No
Handwritten Notes Conditions: i.e. size of note sheet	x	
Typed Notes Conditions: i.e. size of note sheet	x	
Textbooks Conditions: i.e. specific books	x	
Readings Conditions: i.e. specific documents	x	
Websites (Chegg or similar)		x

2. Students are not allowed to work with or talk to other students during quizzes and/or exams.

Online Etiquette Guidelines

Your instructor and fellow students wish to foster a safe online learning environment. All opinions and experiences, no matter how different or controversial they may be perceived, must be respected in the tolerant spirit of academic discourse. You are encouraged to comment, question, or critique an idea but you are not to attack an individual. Our differences, some of which are outlined in the University's inclusion statement below, will add richness to this learning experience. Please consider that sarcasm and humor can be misconstrued in online interactions and generate unintended disruptions. Working as a community of learners, we can build a polite and respectful course ambience. Please read the Netiquette rules for this course:

- Do not dominate any discussion. Give other students the opportunity to join in the discussion.
- Do not use offensive language. Present ideas appropriately.
- Be cautious in using internet language. For example, do not capitalize all letters since this suggests shouting.
- Avoid using vernacular and/or slang language. This could possibly lead to misinterpretation.
- Keep an open mind and be willing to express even your minority opinion.
- Think and edit before you push the "Send" button.
- Do not hesitate to ask for feedback.

LEARNING ACCOMMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

For more information about Disability Services and the process to receive accommodations, visit https://www.stevens.edu/office-disability-services. If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at pgehman@stevens.edu or by phone 201-216-3748.

Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

INCLUSIVITY

Name and Pronoun Usage

As this course includes group work and class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.

Inclusion Statement

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

MENTAL HEALTH RESOURCES

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression). Appointments are can be made by phone (201-216-5177).

EMERGENCY INFORMATION

In the event of an urgent or emergent concern about the safety of yourself or someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year round. For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct.

Other 24/7 national resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text "Home" to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at care@stevens.edu. A member of the CARE Team will respond to your concern as soon as possible.