

Syllabus - CSE 20289 - Systems Programming - Fall 2024

Overview	Systems Programming is a core Computer Science course that explores the fundamentals of computing systems. This course introduces students to the Unix programming environment where they will explore numerical representation, memory management, system calls, data structures, networking, and concurrency. Examining these topics will enable students to become familiar and comfortable with the lower-level aspects of computing, while providing the foundation for further study in subsequent systems courses such as computer architecture and operating systems.
Lecture	MWF 11:30 - 12:20 DeBartolo 125
Instructor	Prof. Aaron Striegel 211B Cushing Hall striegel@nd.edu, 574 631-6896 CSE Slack: striegel
TAs	Group E-Mail: cse20289-fa24-staff-list@nd.edu Annapurna Puttaswamy: aputtasw@nd.edu Tommy Rozgonyi: trozgony@nd.edu Anthony Tsiantis: atsianti@nd.edu Francis Drake: fdrake@nd.edu
Office Hours	See Canvas / Slack
Pre-Requisites	CSE 20311: Fundamentals of Computing
Textbooks	The Linux Command Line by Shotts Automate the Boring Stuff with Python by Sweigart Operating Systems: Three Easy Pieces by Arpaci-Dusseau and Arpaci-Dusseau
Resources	Canvas (https://canvas.nd.edu) CSE Student Machines ND CSE Slack: #cse-20289-fa24 GitHub Repositories: https://github.com/adstriegel/cse20289-fa24

Course Objectives

Upon successful completion of the course, students will be able to:

- Utilize commands to navigate filesystems, manipulate files, manage processes, and explore system and network resources.
- Compose shell scripts that combine common Unix commands with shell syntax to automate tasks.
- Construct regular expressions and software pipelines to filter and process a variety of datasets.
- Employ development tools to debug, profile, and test software applications.
- Build and install software from source distributions or using package managers.
- Compose Python scripts that employ data structures and libraries to process and manipulate data.

- Construct C programs that use low-level functions or system calls to allocate memory, manipulate files and directories, and communicate over sockets.
- Discuss the core tenets of the "Unix Philosophy" and how it is applied to modern software development.

Grading

Quizzes	10%	Exam 1	15%
Homework	35%	Exam 2	15%
		Final Exam	25%

- Most quizzes and homework will have two deadlines, an early one that earns extra credit and a second deadline that receives full credit.
- Generally, materials will be due at 10 PM.
- Quizzes will cover the reading(s) for the lectures in the coming next week.
 - Quizzes completed prior to the Monday lecture by 10 AM will receive 1 point of extra credit.
 - Quizzes completed by Monday evening at 10 PM will receive full credit.
 - Quizzes may not be submitted late.
 - One quiz may be dropped across the semester.
 - In the event of bad quiz questions, everyone will receive full credit for a given question.
- Homework will generally lag lecture and will give you a chance to put into practice what we have covered in lecture.
 - The later of the Canvas submission / Git repository date and time will be used.
 - Assignments will have an extra credit deadline of Friday at 10 PM. Assignments received by Friday at 10 PM will receive a 5% boost to their score (score x 1.05).
 - Assignments will have an official deadline of Monday at 10 PM.
- All materials for the course will be done individually unless specifically noted.
- Inquiries about graded assignments/exams must be made within one week after return by Canvas.
- The late policy for Homework is as follows:
 - Your submission time is the latest commit time for the homework in the appropriate Git repository or the respective Canvas submission, whichever is later.
 - All homework has a five-minute grace period for the due date.
 - After the due date for full credit, the maximum achievable score will be reduced by 25% per day.
 - The final deadline for any submission is that Friday at 10 PM.
- There will be three exams for the class. All exams will be in-person.
 - The exams will allow for a fixed amount of typed or handwritten notes but otherwise will be closed book.
 - Two exams will be held during the semester, the final exam will be held during the normally scheduled finals time (Monday, December 16th - 4:15 - 6:15 PM).

The grade range is as follows:

		94+	A	90-94	A-
87-90	B+	84-87	B	80-84	B-
77-80	C+	74-77	C	70-74	C-
60-70	D	Below 60	F		

Significant performance improvement across the semester may merit upward modifications for grades. Close grades will generally not be rounded up as extra credit opportunities exist as specified earlier for closing said gaps.

In the event of poor class performance on a graded item, the score for that item may be curved. The curve will always result in an improved score for the class, never a reduction.

Course Policies

Diversity and Inclusion

The University of Notre Dame is committed to social justice and diversity. I share that commitment and strive to maintain a positive learning environment based on open communication, mutual respect, and non-discrimination. In this class we will not discriminate on the basis of race, sex, age, economic class, disability, veteran status, religion, sexual orientation, color, or national origin. Any suggestions as to how to further such a positive and open environment will be appreciated and given serious consideration.

Honor Code

As a member of the Notre Dame community, you acknowledge that it is your responsibility to learn and abide by principles of intellectual honesty and academic integrity, and therefore you will not participate in nor tolerate academic dishonesty.

With the rise of various AI-based writing tools and the prevalence of on-line resources, a rough rule of thumb is that if you are pasting from the AI tool into your code, that will run afoul of the honor code. Think debugging and troubleshooting, not solving. When in doubt, think and solve it out.

If you are unsure, please reach out to the instructor prior to submission / usage.

Lecture

Lecture will be streamed / recorded via Zoom in an outbound manner only. Zoom information may be found via Canvas. While in-person lecture is strongly recommended, your health and safety are paramount and should take precedence. Lectures (live discussion) will be recorded and shared via Canvas / Panopto. Access to the discussions will be restricted to class members. Permission is granted only for these recordings to be used as related to the class.

It is prohibited to share live in-class recordings, student work products (e.g. posts on a discussion board, written work) or communications outside the course community, except by permission. Remember, our classrooms are communities built on trust, and that our learning and teaching relies upon a shared sense of respect, integrity, and common purpose.

Readings will be posted / shared on Fridays as well as reflected on the course schedule. The Monday quiz will cover materials that will be addressed that week in lecture.

Homework

Course homework will be of varying complexity for the course with the weight for the homework adjusted appropriately. The total number of homework may be varied depending on course progress with a rough target of one per week.

- We will have a blend of individual and group homework.
- You are welcome to do your development on your local machine.
- Homework should be tested on the student machines to ensure correctness. All grading will be conducted on the CSE student machines. Earlier homework will have smaller weights to help ensure proper submission alignment.
- Homework is meant to reinforce critical concepts for the course. However, as homework can sometimes spin into non-deterministic completion durations, guidelines and off ramps will be provided for each assignment.
- Note that while offramps will be provided and high-level rubrics will be outlined, the specific test cases and evaluation mechanisms will not be shared until after grading. The reason is to encourage you to develop robust and reliable code which are essential skills when coding.
- Consistent git commits and documentation are essential, especially for partial credit.

Office Hours

- The staff e-mail alias (cse20289-fa24-staff-list@nd.edu) will send an e-mail to the instructor and TAs.
- The departmental Slack is an excellent option for faster communications / responses. Use @ to help tag Prof. Striegel or the TAs if you need a faster response.
- The purpose of the instructor and TA office hours are to help you think through your code and to assist with strategies in debugging your code. When coming to office hours, be prepared to explain the current strategies you have applied and questions or guidance that you would like help with.
- Outside of major technical issues with course homework, there will be only limited help available for the homework outside of normal working hours. Please plan appropriately.

Other Policies

- In-person lecture is highly recommended. Past courses generally show a 5-7% final grade improvement for those who regularly attend lecture.
- Be pro-active to the extent possible. Start homework early and try to embrace a work-conserving approach to reading / quizzes / homework (e.g. work early rather than waiting as close as possible to the deadline).
- Extensions are generally granted when requested sufficiently early as the specific situation warrants.