New Jersey Institute of Technology

CS288 - Intensive Programming in Linux

Course Syllabus
Fall - 2024

Instructor: **Mohit Dale**
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Office hours: Thursday && Friday 4pm to 5pm || by appointment (Zoom)
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Class TA: **TBD**

Class Meetings:

CS288-007: Friday: 1PM to 3:50PM- **Location**: KUPF 211
CS288-009: Wednesday and Friday: 8:30AM to 9:50AM- **Location**: KUPF 106
CS288-101: Saturday 9AM to 11:50AM - **Location**: KUPF 207
CS288-103: Saturday 1PM to 3:50PM - **Location**: KUPF 117

Course Description:

This comprehensive program is designed to provide students with a strong foundation in programming concepts and practical skills within the Linux environment. Over the duration of the course, we will cover a wide range of topics such as Bash, C programming, and Linux system API; methods and algorithms for processing web data, such as searching trees and matrix computing; end-to-end applications such as one that constantly presents top 100 stocks; and extending the applications to run on multiple machines to equip you with the necessary tools and knowledge to become proficient in the Linux environment.

Course Outcome:

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

- Have a solid understanding of the Linux command line interface and be able to navigate, manipulate files, and execute commands efficiently.
- bash scripting, enabling you to automate tasks and create powerful scripts.

- Be proficient in using regular expressions, a fundamental skill for pattern matching and text processing in Linux.
- Gain the ability to debug C programs effectively, employing various debugging techniques to identify and fix issues in your code.
- Understand the binary representation of data and be able to perform bitwise operations, enabling you to work with binary data efficiently.
- Learn radix-sort, a powerful sorting algorithm, and apply it to efficiently sort.
- C pointers and dynamic multi-dimensional arrays, essential for managing memory and manipulating complex data structures.
- Explore self-referential structures and linked lists, fundamental concepts in data structures and algorithms, and gain the ability to implement them in C.
- Acquire knowledge and skills in A* search, a widely used algorithm for pathfinding and problem-solving.
- Develop proficiency in Linux file operations and directory operations, allowing you to create, modify, and manage files and directories programmatically.
- Learn how to write programs with multiple threads, enabling you to leverage parallelism and concurrency in your applications.
- Gain insight into parallel computing with MPI (Message Passing Interface), a powerful framework for developing high-performance parallel applications.
- Explore the exciting field of web scraping, learning how to extract data from websites programmatically and utilize it.

Prerequisites:

- CS 100 Roadmap to Computing
- CS 280 Programming Language Concepts
- We will be using the C programming language in this Course, you need to know how to write C programs.
- Additionally, this Course is all about Linux Systems, you will be using Linux CLI (Command Line Interface).

Course Material:

We will use powerpoint slides and a collection of papers/ articles / blogs for our class. All the course materials will be available on canvas.

Recommended Book:

The C Programming Language, Kernighan and Ritchie, Prentice Hall, 2nd edition, ISBN: 978-0131103627.

Communication:

This course uses Canvas for announcements and discussion. If you have questions about the class materials or assignments, requests for clarification, or other issues that may interest the class as a whole, post them to the Discussion Forum in Canvas.
If you have any further questions that you are confident do not belong on Canvas, drop me an email and I will respond within 24 hours (use NJIT email).

Grading Policy:

Homeworks	**20%**
Midterm - 1	**25%**
Midterm - 2	**25%**
Final	**30%**
Total	**100%**

*Active class participation is Necessary.

Homeworks:

Homeworks will have several tasks where code needs to be completed. Each Homework will have its own detailed instructions. In addition, own research on the details of the implementation needs to be conducted. Each Homework will be given a week time to be completed and submitted via Canvas. (More details on Homeworks will be given in the future).

Exams:

All Exams including mid-term and final will be closed book, failure to attend the exam will result in zero for that particular exam and there will be NO make up exams if you miss.

Late Policy

Assignments due date will be provided for each Assignment on canvas and students are expected to submit on the day of due date, failing to submit before the due date will result in a penalty of 10% deduction for each day late. No Exceptions will be made unless the student genuinely has a serious problem (like medical, family etc.)

Grading Scale:

Grade	**Significance**
85-100	A (Excellent)
75-84	B+ (Very Good)
65-74	B (Good)
60-64	C+ (Acceptable)
56-59	C (Marginal Performance)
51-55	D (Minimal Performance)
50 and below	(F) Fail

Grade Corrections

Check the grades in course work and report errors promptly. Please try and resolve any issue within one week of the grade notification.

NJIT Honor Code:

Any evidence of cheating in any form, including plagiarism, Submitting other student Homeworks etc, will be dealt with according to the honor code of NJIT (course failure and suspension or expulsion). Please note: There will be no warnings or chances with regard to cheating. Any discovered case of cheating will be immediately passed to the Dean of Students for further investigation. Cheating is not worth it. You may not only fail this course but also be suspended from NJIT. The full text of the NJIT Honor Code is available for your review at: https://www5.njit.edu/policies/sites/policies/files/NJIT-University-Policy-on-Academic-Integrity.pdf

A set of ethical principles governing this course:

- It is okay to share information and knowledge with your colleagues/classmates, but
- **It is not okay** to share the code,
- **It is not okay** to post or give out your code to others (also in the future!),
- **It is not okay** to use code from others for Assignment!

Course Schedule: -

* Note: The course outline and content are Subject to modification.
The syllabus is divided into **3** stages.

Week	Topics
	Stage - 1
1	• **Presentation**- Course Introduction • **Presentation**- Introduction to Linux Environment (CLI)
2	• **Presentation**- Bash Shell Scripting
3	• **Presentation**- Pattern Matching with Regular Expressions
	Stage - 2
4	• **Presentation**- Debugging in C (GDB Tutorial) (3.1~3.2), • **Presentation**- Binary representation of data (4.7, 4.3, 4.8) • **Presentation**- Bitwise operators (4.6)

5	• Midterm Exam - 1
	  ○ **CS288-007**: 10/04/2024
	  ○ **CS288-009**: 10/04/2024
	  ○ **CS288-101**: 10/05/2024
	  ○ **CS288-103**: 10/05/2024

6	• **Presentation**- Radix-sort • **Presentation**- C Pointer variables and Memory Addresses (2.1~2.6, 2.9.2~2.9.4)
7	• **Presentation**- C Pointer variables (Pointer to Pointer) and (Dynamic) multidimensional arrays, CommandLine Arguments (2.1~2.6, 2.9.2~2.9.4)
	Stage - 3
8	• **Presentation**- Structures and Linked list (2.7) • **Presentation**- A* Search and State Space Search

9	• Midterm Exam -2
	  ○ **CS288-007**: 11/01/2024
	  ○ **CS288-009**: 11/01/2024
	  ○ **CS288-101**: 11/02/2024
	  ○ **CS288-103**: 11/02/2024

10	• **Presentation** - Programs with multiple threads (14.1~14.3)

11	• **Presentation** - Parallel computing with MPI (15.2)
12	• **Presentation**- Web Scraping
13	• **Presentation**- Web Scraping (Continuation)
14	• Reading Day
15	• Final Exams - See the registrar's page for final date