CST 357/457 – Systems Programming – Fall 2023

Michael E. Ruth, Ph.D.
   Course Meetings (Face to Face): M/W, 9:30a – 10:45a @ AUD 326   **Credit Hours:** 3 hours
   Office(s) & Hours: (Also by appointment – email for time/location)
   AUD 344B & Zoom (details on BB): Th 12p to 2p (AUD 835 for 12p to 1p)
   Email (preferred): mruth@roosevelt.edu   **Phone:** (312) 281-3303

Course Description:
   Introduction to programming at the system level. Programming methods and issues that are specific to working with the operating system. Topics include process, thread model, synchronous and asynchronous event handling, IPC, RPCs and sockets, and distributed applications. Course includes learning to program with C in a UNIX environment. A computer use course.

Course Prerequisites:
   (CST 250 or CST 365 with a min grade of C-) or (CST/CSIA 354 concurrently)

University's Overall Learning Goals:
- Goal: Effective communication.
- Goal: Knowledge of disciplined-focused content.
- Goal: Awareness of social justice and engagement in civic life.

Course Objectives:
- Demonstrate mastery in introductory/intermediate programming in C programming.
- Examine and demonstrate the use of system calls including error returns & operations.
- Demonstrate the use of UNIX commands and tools to edit, compile, run, and debug C programs as well as viewing and managing processes and other system resources in Linux.
- Implement small to medium programs which illustrate the use of system calls to manage processes and threads, utilize I/O resources, and utilize inter-process communication.
- Understand the fundamentals of concurrent programming including threads and processes and communication between them using either IPC or network sockets.

Textbook:
   Linux System Programming (2ⁿᵈ Ed) by R. Love
   ISBN: 978-1449339531

Methodology:
   The course will primarily consist of lectures and demonstrations and individual assignments designed to focus on the course objectives.

Grading (+/- grading is used)
- 2 Exams (Exam #1 = 10%, Exam #2 = 20%)
- Final Exam (30%)
- Class Participation/Assignments (40%)
  - 5 assignments equally weighted

Grading Scale:
Letter grades will be determined by the following scale:

Average	Grade
93 - 100	A
90 – 92	A-
87 – 89	B+
83 – 86	B
80 – 82	B-
77 – 79	C+
73 – 76	C
70 – 72	C-
67 – 69	D+
60 – 66	D
< 60	F

Course Policies:
- You only have **three free** absences. After that, you will be penalized a letter grade for each additional absence. I will take attendance and I will enforce this. ***Make them count!***
- ***If you are late three times (at least 5 minutes late), it will count as an absence.***
- ***If you are later than 15 minutes, it will count as an absence.***
- The course will primarily be conducted in the classroom. If a class becomes remote or online for any reason, you will be notified in advance of the class meeting.
- **You are responsible** for all material covered and announcements regardless of delivery.
  - Please read all course announcements on blackboard and check your email regularly
- **Every assignment given will count towards your assignment grade.**
- **There will be no make-up examinations.**
  - If you miss Exam #1 or Exam #2, your Final Exam will count for both
- If you send me a question using university email, I will respond to you within 24 hours.
- All assignments will be returned with my response/grade within one week of its due date.
- Course website will be on blackboard.roosevelt.edu (the total score in blackboard is meaningless)
- You are only allowed to use material learned within the class for all graded work.
  - If in doubt, ask. Permission is much safer than forgiveness in my classes.
- Late homework will only be accepted at **my** discretion.
  - Late homework will never be accepted after the solution has been posted.
- **Graduate students must perform at a graduate level and do (extra) graduate work.**
- Please be considerate of your instructor and the classmates around you!

Important dates:

Full Semester 16 weeks	Classes start	Classes end	Grades available online	Last Day for "W" grade	Thanksgiving Break
	08/28/23	12/16/23	12/22/23	11/02/23	Tuesday-Sunday 11/21/2023 - 11/26/2023

I – grade (incomplete) Policy:

A grade of incomplete may be given only with the consent of the instructor and appropriate notification to the Office of the Registrar and the instructor's dean or department chair. A student should only receive an Incomplete grade if:

- The student initiates the request for an incomplete grade before the end of the academic term; and
- The student is in good standing the course and has completed a majority of the coursework (usually at least 75% of the coursework); and
- A medical condition or other serious, non-academic extenuating circumstance (as documented with the Office of the Dean of Students) prevents them from completing a small portion of the coursework required to complete the course prior to the end of the term; and
- The required work may be reasonably completed in an agreed-upon timeframe with the faculty member (no later than the end of the next semester, excluding summer); and
- The required work does not require the student to retake any portion of the course.

Very Tentative Course Schedule:

Date	Topic	Reading	HMWK
8/28	Introduction to 357/Systems Programming	1	
8/30	Linux Fundamentals	1	
9/6	Introduction to Environment + IDE	TBD	
9/11	Introduction to C: Data Types & Variables	TBD	H1G
9/13	Introduction to C: Control Flow & Functions	TBD	
9/18	Arrays & Pointers	TBD	H1D, H2G
9/20	Arrays & Pointers (cont)	TBD	
9/25	Structs	TBD	H2D
9/27	**Exam #1 (Covers everything from 8/28 to 9/25)**		
10/2	Introduction to File I/O + Buffering	2, 3	
10/4	Introduction to File I/O + Buffering (cont)	2, 3	
10/9	File Processing	TBD	
10/11	File System I/O	8	H3G
10/16	File System I/O (cont.)	8	
10/18	Process Management	5	H3D, H4G
10/23	Process Management (cont.)	5	
10/25	**Exam #2 (Covers everything from 10/2 to 10/23)**		
10/30	Introduction to POSIX Threads (pthreads)	7	H4D
11/1	Programming with pthreads	7	
11/6	More Programming with pthreads	7	
11/8	More Programming with pthreads (cont.)	7	
11/13	Interprocess Communication (IPC)	10	
11/15	Programming with Signals & Pipes	10	H5G
11/20	Timing & Timers	11	
11/27	Programming with Timing & Timers	11	
11/29	Introduction to Network Programming & Sockets	TBD	H5D
12/4	Programming with Sockets	TBD	
12/6	Programming with Sockets (cont.)	TBD	
12/13	**Final Exam (Covers everything from 10/30 to 12/11)**		