

## CS/SE 3377.005 Systems Programming in Unix and Other Environments

Tuesdays & Thursdays 11:30AM - 12:45PM - ECSS 2.412

Website: [elearning.utdallas.edu](http://elearning.utdallas.edu) (activities, assignments, grades, etc.)

Slides and recordings in Box folder: <https://utd.link/s26linux5>

Programs: ~veerasam/linux5 directory in cs1/cs2/cs3 Linux servers

<b>Instructor</b>	<i>Office hours</i> (ECSS 4.602 and Online in MS Teams <a href="http://utd.link/jey">utd.link/jey</a> ): Tue & Thu 10-11am (IN-PERSON) and 1:30-2:30pm (ONLINE) <i>Communication:</i> MS Teams chat (preferred) or email <a href="mailto:jeyv@utdallas.edu">jeyv@utdallas.edu</a>
<b>TA</b>	TBD <i>Online Office hours</i> in MS Teams <a href="http://utd.link/jey">utd.link/jey</a> <i>Mondays:</i> TBD <i>Tuesdays:</i> TBD <i>Wednesdays:</i> TBD <i>Thursdays:</i> TBD <i>Fridays:</i> TBD <i>Saturdays:</i> TBD <i>Sundays:</i> TBD

### Course Description

**CS/SE 3377** Systems Programming in UNIX and Other Environments (3 semester credit hours)

Basic UNIX concepts, commands and utilities, organization of UNIX file system including links and access control, creating and managing UNIX processes and threads, implementing algorithms using shell scripts, basic networking concepts including socket and client-server programming, inter-process communication using pipes and signals, using a version control system to manage work, and introduction to cloud computing. Design and implementation of a comprehensive programming project is required.

*Prerequisite:* CS/CE 2336/2337 with a grade of C or better or equivalent.

*Notes:* CS 1336 (Programming Fundamentals) --> CS 1337 (Computer Science I) --> CS 2336/2337 (Computer Science II) is the sequence of programming courses offered by UT Dallas CS. So, you should have completed CS1336 & CS1337 or CS2337 in C/C++ programming and/or have a proficient programming experience with C/C++. Without prior experience in C/C++, this course will be challenging - be ready to invest additional hours for this course!

### ***Student Learning Objectives/Outcomes***

1. Ability to use Unix/Linux operating system (command line interface, shell scripting, regular expression).
2. Ability to use Unix/Linux programming environment and development tools.
3. Ability to program with Unix/Linux processes, threads, and inter-process communication facilities.
4. Ability to program with Unix/Linux file system, file input and output, and redirection.
5. Ability to develop programs for network environment (client-server model, socket programming, and cloud computing).

### ***Required Textbooks and Materials***

Both books are available online & free via [UTD Library => eBook => O'Reilly Online Learning](#) (need to login with UTD email address to access these ebooks):

1. *A Practical Guide to Linux® Commands, Editors, and Shell Programming*, 3ed.

Mark G. Sobell. Prentice Hall. © 2012. ISBN-10: 0-13-308504-X. ISBN-13: 9780133085044

Note. 4ed is also available and acceptable. This book is referred as [Sobell].

Sobell source code: <http://www.sobell.com/CR3>

<https://learning.oreilly.com/library/view/practical-guide-to/9780134774626>

2. *Advanced Programming in the UNIX® Environment*, 3e. W. Richard Stevens and Stephen A. Rago. Addison-Wesley. © 2013. ISBN-10: 0-321-63773-9. ISBN-13: 9780321637734 This book is referred as [APUE].

APUE source code: <http://www.apuebook.com/code3e.html>

<https://learning.oreilly.com/library/view/advanced-programming-in/9780321638014>

## TENTATIVE Academic Calendar\*

Week #	TOPIC/LECTURE
1	Starts on Tuesday, Jan 20 <ul style="list-style-type: none"><li>• Course Syllabus &amp; Course Introduction</li><li>• Unix/Linux Introduction</li><li>• First log in to cs1.utdallas.edu (or cs2/cs3)<ul style="list-style-type: none"><li>• install <a href="#">mobaXterm</a>/teraterm/putty for Windows, <a href="#">coreshell.app</a> for Mac</li></ul></li><li>• Oracle VirtualBox &amp; Ubuntu for personal Linux box</li><li>• Simple C programming with clone.c</li></ul>
2	Unix/Linux Introduction & Commands <ul style="list-style-type: none"><li>• Learn basic Unix/Linux Commands</li><li>• Simple File editing with vi editor (Sobell Ch6)</li></ul>
3	Unix, Linux Commands (Advanced), Makefile File Systems (Sobell Ch4), Shell (Sobell Ch5)
4	Bourne Again Shell - Bash shell (Sobell 8, 10) Shell Script Programming with bash
5	Unix/Linux System Prog & API APUE Ch01
6	Unix File Systems and IO, and API (APUE Ch03-Ch04) <b>Test 1 - Saturday Feb 28 at 10am</b>
7	Pointers & Memory management
8	Unix/Linux Process (APUE Ch07-Ch08)
9	Shell and Signal (APUE Ch09-Ch10)
10	Thread Programming (APUE Ch11)
11	Inter-process Communication (APUE Ch11.6 & Ch15)

12	Socket Programming (APUE Ch16) <b>Test 2 - Saturday April 18 at 10am</b>
13	Socket Programming, Client-Server
14	Concurrent Server
15	Advanced Topics: Cloud Computing, VCS (Git, Github, etc)
-	<b>Final Exam Week - Test 3 - Date TBD</b>

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## Grading Policy

Here is the standard mapping used for mapping the weighted total to letter grades in UTD. You have to earn every point. Course credit is only given for work assigned in the course schedule. No extra work will be assigned for credit. You should check your gradebook entries (My Grades) every week - report any discrepancies/concerns to the professor ASAP, latest by 2 weeks after each item is graded.

Tests	50%	<p>There will be 3 tests, as shown in the schedule above. Best 2 test scores will be used to compute the weighted total (effectively, each of those 2 tests will contribute 25%) You will be given an opportunity to review your Test 1 and Test 2 and improve your score by 5 points! However, there will be NO such opportunity for Test 3. I prefer not to stress you with limited test duration - that is one reason why we don't conduct the tests during the class time - First 2 tests will be conducted on Saturdays and Test 3 will follow the final exam schedule.</p> <p>We will use Lockdown Browser to take the tests in closed-book closed-notes format - bring your laptop with your charger. Each test will have 30-40 multiple-choice / fill-in-the-blank questions &amp; 1 or 2 coding questions worth 10 points each. Test 2 will primarily be based on the material covered after Test 1. Test3 will be comprehensive &amp; it will be conducted as per the final exam schedule published by the registrar's office. Given the fact that the best 2 test scores will be used, make-up test will NOT be given</p>
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		<p>unless there is acceptable reason (like verifiable Dr note, official off-site event participation, conflict with another course, etc.).</p> <p>Most of the questions will be closely related to the material covered in the class and the assignments. So, the best way to prepare for the test will be to attend each class &amp; pay attention, complete the activities and weekly assignments &amp; get your doubts clarified in timely manner. With such approach, really there is no extra preparation is needed for the tests!</p>
Assignments	30%	<p>There will be weekly assignments, most of them due on Sundays &amp; they will have equal weightage - all of them together will contribute 30% to the final weighted grade. Right way to approach any programming assignment is to start right away &amp; ask for help when you get stuck (you can approach the instructor or TAs for help during office hours - we will help you to get the past glitch and enable you to complete the remaining stuff on your own). Do not waste hours trying to fix a small glitch or do not use ChatGPT or web resources either! In simple words, your approach will determine whether the programming assignments provide an enjoyable learning experience or end up as painful &amp; seemingly useless activities. One more thing: The more you complete the assignments on your own, the better prepared you'll be for the exams!</p> <p>Complexity level of each assignment will vary - each assignment may take several hours to complete. You are expected to start working on them as soon as they are posted so that you have "enough" time to work through the glitches, get the necessary help &amp; still manage to submit on time. Do not expect me or the TA to rescue you at the 11th hour! Late submissions will be accepted with 10% penalty for 3 additional days (until Wednesday night). If you cannot complete an assignment due to medical condition, send the Doctor note to the professor using MS Teams chat. You will be given a few additional days to complete the assignment.</p> <p>Plagiarism has no place in the college education. UTD policies require all the professors to forward all suspicious cases to academic disciplinary committee. If the instructor believes a student has committed an act of plagiarism, student will be referred to UTD administration directly - Review</p>

		<p><a href="https://utdallas.edu/conduct/integrity">utdallas.edu/conduct/integrity</a> &amp; <a href="https://utdallas.edu/conduct/manage-dishonesty">utdallas.edu/conduct/manage-dishonesty</a> for details. So, do not copy the code from others or use ChatGPT or web resources too much - do not share your code with others either - you can utilize ChatGPT-like resources when you go to the real job! Assignment related questions will appear in the tests - you cannot answer them properly unless you do the assignments on your own.</p>
Activities	20%	<p>There will be 3 to 4 activities every week to ensure that you are keeping up with the class content (complete in-class activity, review online content or take quiz etc.) So, bring your laptop to every class - all the activities will contribute equally &amp; together they will account for 20% of your final grade.</p> <p>Activities ensure that you are keeping up with the course - they cannot be made up after the deadline! In other words, late submissions will NOT be accepted for grade, however 5 lowest scores will be dropped when computing the final grade, to cover common issues like car-trouble, overslept, occasional health issue, etc. You should be able to earn full 20% if you attend all the sessions &amp; complete all the activities. If you cannot complete an activity due to medical condition, send the Doctor note to the professor using MS Teams chat. When the semester ends, if such activities are affecting your weighted total, professor will adjust the score manually.</p>

Here is the mapping used to map the weighted total to letter grades. Guaranteed way to get the specific grade is to earn it with your work! However, depending on the whole class performance, I may curve the final grades to attain a meaningful distribution, so there is absolutely NO guarantee about curving!

A+ $\geq$ 97	97 > A $\geq$ 94	94 > A- $\geq$ 90
90 > B+ $\geq$ 87	87 > B $\geq$ 84	84 > B- $\geq$ 80
80 > C+ $\geq$ 77	77 > C $\geq$ 74	74 > C- $\geq$ 70
70 > D+ $\geq$ 67	67 > D $\geq$ 64	64 > D- $\geq$ 60
60 > F		

Weighted total in your gradebook shows the current weighted grade based on your graded work. For example, if we have only 2 graded assignments & 2 weeks of activities so far, current grade will be based on only those entries. Your weighted total & corresponding letter grade will continue to change (go up & down) throughout the term as more graded items are included. So, do not be surprised!

### ***Course & Instructor Policies***

While TAs may assist the professor for grading the weekly assignments, send all your grade related concerns to the professor. You should check My Grades every week & bring up any issues as quickly as possible, no later than a week after each item is graded. It may not be possible to give a detailed feedback for each weekly assignment due to large number of students enrolled in our classes. If you need more details/clarification, please meet the TA/instructor online during office hours. While almost all activity submissions will get full points, we may randomly check the submissions and assign 0 if your submission is not relevant to the activity.

TAs and professor are here to help! You are encouraged to attend the virtual office hours of TAs and professor to get help for weekly assignments. Use MS Teams chat messages or emails only if you cannot come to office hours. We expect to complete grading assignments, weekly activities or quizzes, and tests typically in a week. However, when the schedule gets too busy, it can be as long as 2 weeks before the grades are assigned.

### **Class Recordings**

All class sessions will be auto-recorded in MS Teams so that you can use them for future reference (particularly when complex topics are covered & you want to review again). However, students will NOT be allowed to join the sessions ONLINE. If the instructor or a UTD school/department/office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law.

### **Comet Creed**

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same: "As a Comet, I pledge honesty, integrity, and service in all that I do."

Plagiarism has NO place in the college education! UTD policies require all the professors to forward all suspicious cases to academic disciplinary committee. No exceptions. So, do not copy the code from others & do not give your code to others.

Please review the UTD policy and guideline on Student behavior and conduct, academic honesty and integrity in <https://www.utdallas.edu/conduct/integrity/> and UTD BAIT team in <https://www.utd.edu/conduct/bait/>

## **Academic Support Resources**

The information contained in the following link lists the University's academic support resources for all students. Please see <http://go.utdallas.edu/academic-support-resources>.

## **UT Dallas Syllabus Policies and Procedures**

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please go to <http://go.utdallas.edu/syllabus-policies> for these policies.

***The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor or CS department.***