

# CSci 553 Unix Systems, Software Development and Networking

Course Syllabus

Spring 2015

## **Instructor**

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## **Class Meetings**

Lectures and course materials will be distributed through our University's eCollege online course system.

01E 22567 W 11:00a - 1:40p Location: Jour 104

## **Course Description**

This course is designed to introduce advanced concepts of programming and software development in UNIX-based computing environments. The UNIX model of networking, inter-process communication (IPC), and TCP/IP sockets will be a secondary focus, as an example of applying software development tools and techniques to developing software in a UNIX environment. The class will include programming projects involving intensive coding of applications to demonstrate the development of software in a Unix software development environment.

## Requirements and Objectives

The course is one of the three required courses for completion of the networking track of the Masters program in Computer Science at TAMU-C. The topic of focus in this course is UNIX network programming. This course also includes an intensive introduction to basic software development tools and practices for programmers, scientists and engineers, in the UNIX programming environment.

In the first half of the course we will introduce students to standard programming and software development tools in the UNIX environment. This includes a detailed look at using the UNIX shell command line. We will also look at development tools that help to streamline and automate the development process, including revision control systems (subversion), automated build tools (make and ant), and debuggers, linkers, system libraries and other standard GNU gcc toolchain functions.

In the second half of the course the student will apply these tools and techniques to developing simple client/server applications using the standard UNIX network programming tools and protocols. We will be focusing on the standard Posix C socket library for doing client/server development. All programs and code in this course will be developed in plain C, using standard Posix system libraries and functions. As part of this course, you will complete labs and programming assignments through online submissions on eCollege and through a source code repository.

## Companion Textbooks / Readings

Most materials, work and readings will be assigned using freely available online textbooks and resources. The following are a list of some of the resources we will be using this semester.

- Software Carpentry by Greg Wilson, Web Course: <http://software-carpentry.org>
- UNIX Tutorial for Beginners, Surry University, Web Course: <http://www.ee.surrey.ac.uk/Teaching>
- The Art of Unix Programming by Eric S. Raymond, Addison Wesley Professional, 2003, <http://www.faqs.org/hdocs/artu>
- Linkers and Loaders by Sandeep Grover, Linux Journal article, <http://www.linuxjournal.com/article/6463>

- Linux software debugging with GDB by David Seager, IBM.com Articles, <http://www.ibm.com/developerworks/library/l-gdb>
- UNIX Network Programming, Vol. 1: The Sockets Networking API, 3/E by Richard Stevens, Addison-Wesley Professional, 2003
- Beej's Guide to Network Programming by Brian "Beej Jorgensen" Hall, <http://www.beej.us/guide/bgnet/output/html/multipage/index.html>

## Prerequisites

Successfully passing CSci 525, CSci 530 with a minimum grade of C is required to attend this course.

## Evaluation (Tentative)

Your grade for the course will be based on the following (approximate) percentages:

Two Exams	50% (25% each)
Labs / Programming Assignments (appx. 6-8)	45%
Quizzes and Participation	5%

## Student's with Disabilities

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact: Office of Student Disability Resources and Services, Texas A&M University-Commerce, Gee Library, Room 132, Phone (903) 886-5150, [StudentDisabilityServices@tamuc.edu](mailto:StudentDisabilityServices@tamuc.edu)

## Academic Ethics

"All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment." (See Student's Guide Handbook, Policies and Procedures, Conduct).

Ethics also includes the issue of plagiarism, and copying code for programming/lab assignments is just as serious as any other type of plagiarism. If you are caught sharing or using other people's work in this class, you will receive a 0 grade and a warning on the first instance. A subsequent instance will result in receiving an F grade for the course, and possible disciplinary proceedings.

## **Attendance Policy**

Students are expected to follow all instructions and visit eCollege regularly many times weekly to complete the materials for this online course. If a student is unable to submit assignments by the due date for the assignment, they are expected to make alternative arrangements to assure that the assignment is turned in ON TIME, before the assignment is actually due. Any student wishing to withdraw from the course must do so officially as outlined in the class schedule. THE INSTRUCTOR CANNOT DROP OR WITHDRAW ANY STUDENT.

## **Course Requirement Deadlines**

Credit will be given for ONLY those exam(s), program(s), and/or project(s) turned in no later than the deadline(s) as announced by the instructor of this class unless prior arrangement has been made with the instructor.

## Course Schedule (Preliminary)

W	Date	Topic / Activity
1	1/20	The Unix Shell and command line tools
2	1/26	Distributed version control with git
3	2/2	Compiling, linking, loading and the gnu C toolchain
4	2/9	Make and automating build (and other) tasks
5	2/16	Unix systems programming
6	2/23	Basic UNIX administration
7	3/2	Introduction to Networking basic concepts
8	3/9	Building a LAMP stack (Linux, Apache HTTP server, MySQL relational database, PHP)
	3/16	Spring Break
9	3/23	Command line arguments, builing and understanding command line tools
10	3/30	TCP/IP protocol, IPv4 and IPv6
11	4/6	Signals and messages
12	4/13	TCP Socket Programming
13	4/20	UDP protocol, programs and sockets
14	4/27	I/O multiplexing
15	5/4	Threads, Daemons and Unix server processes
	5/11	Finals Week

## Student Learning Outcomes

1. Learn about Unix software development tools.
2. Learn core Unix shell commands.
3. Learn Unix systems programming, signals, forking, stdio libraries, etc.
4. Learn about concurrent and distributed computing.
5. Become familiar with TCP and UDP sockets.
6. Be able to create simple TCP Client/Server applications using Posix C sockets library.

Learning outcomes will be measured through mapping assignment and test questions to specific outcome items, as well as through exit surveys of student experiences with the outcome familiarity.