College of Software Engineering

Undergraduate Course Syllabus

Course ID	31102730	Course Name	UNIX Operating System		
Course Attribute	□Compulsory ■Selective		**Course Language**	■English □Chinese	
Credit Hour	3		**Period**	48	
Semester	□First Fall □First Spring □Second Fall □Second Spring ■Third Fall □Third Spring □Fourth Fall □Fourth Spring				
Instructors	Feng Lin, Kui Zhao				
Description	**UNIX Operating System** is a hands-on introduction to the UNIX programming environment. It introduces students to the basic operating system concepts employed by UNIX, file management, application use, network access, system utilities, filters, scripting, and related software package. Upon completing the course, it is expected that the students will have the following fundamental skills: ✓ managing a hierarchical file system for user account organization ✓ using fundamental UNIX commands and UNIX file utilities ✓ using a typical text editor (vi or emacs) in UNIX ✓ programming scripts with the "shell" ✓ using GNU software package.				
Prerequisites	C Language Programming Operating System Data Structures & Algorithmic				
Textbook	. *UNIX the textbook* **2ⁿᵈ edition** by Sarwar, Koretsky, Sarwar Addison Wesley. ISBN 0-321-22731-X				
Resource	1. UNIX FAQ http://www.unix.org/ 2. UNIX, Linux commands, information and help http://www.computerhope.com/unix.htm 3. Bash Script http://www.faqs.org/faqs/unix-faq/bash/index.html 4. UNIX Tutorial for Beginners http://www.ee.surrey.ac.uk/Teaching/Unix/				
Grading	quizzes, & class participation (20%), lab assignments (30%), final exam (50%)				

Topics	1. Getting Started With UNIX (3 H) ✓ Review Some Concepts of Operating System ✓ Brief History of UNIX ✓ Quick Start into UNIX ■ Logging On and Logging Off ■ UNIX Command Basics ■ On-line Help ■ Utility Commands ■ Some Important Control Key Combinations ✓ Architecture of UNIX System ■ UNIX architecture overview ■ Device driver layer ■ UNIX kernel ■ System call & language library 2. UNIX Shells, and Editors (3 H) ✓ UNIX Shells ■ What is shell? ■ How the shell works ■ Various UNIX Shells ■ Environment Variables ■ Configuration Files and Startup Files ■ Shell Metacharacters ✓ UNIX Text Editors ■ Emacs ■ vi 3. Files, File System and File Security (3 H) ✓ UNIX Files ■ The Concept of UNIX Files ■ Types of UNIX Files ✓ UNIX File System ■ Typical UNIX File System ■ Typical Directories ■ File and Directory Names ■ Pathnames ■ Navigating in File System ■ File Representation and Storage in UNIX ■ Standard Files and File Descriptors ✓ UNIX File Security ■ Security Mechanisms on UNIX ■ The Types of File Users ■ Types of File Operations/Access Permissions ■ Changing File Access Privileges ■ Special Access Bits

4. File Processing (3 H)
- ✓ Viewing Contents of Text Files
- ✓ Copying, Moving, and Removing Files
- ✓ Comparing Files
- ✓ Printing Files
- ✓ Compressing Files
- ✓ Encoding and Decoding
- ✓ File Encryption and Decryption
- ✓ Pattern Matching and Regular Expressions

5. File Sharing, Redirection, and Piping (3 H)
- ✓ File Sharing
  - ■ Methods of File Sharing on UNIX
  - ■ Linking File: hard link & soft link
- ✓ Redirection
  - ■ Review Standard Files
  - ■ File Redirection
  - ■ Input Redirection
  - ■ Output Redirection
  - ■ Combining Input and Output Redirection
  - ■ I/O Redirection with File Descriptors
  - ■ Redirecting stderr
  - ■ Combine all the standard files Redirection
  - ■ Redirecting without Overwriting File Content
  - ■ Possible Uses for I/O Redirection
- ✓ Piping
  - ■ UNIX Pipes
  - ■ Why we need pipes?
  - ■ A Paradigm of Piping—Applying Filters
  - ■ Split   Output
  - ■ Error Redirection in C Shell
  - ■ Recap of I/O and Error Redirection

6. Process (3 H)
- ✓ UNIX Process Overview
- ✓ Scheduling in UNIX
- ✓ UNIX Process States
- ✓ UNIX Process Creation
- ✓ Execution of Shell Commands
- ✓ Process Attributes
- ✓ Process and Job Control
- ✓ Process Hierarchy in UNIX

7.   Network Tools   (3 H)
- ✓ Checking network setup.
  - ■ ifconfig command, route command, netstat command, dig command, host

command, and hostname command
- ✓ Checking network communication status:
    - ■ ping command, traceroute command, and nslookup command
- ✓ Remote operations
    - ■ Listing Users Using Host on a Network
    - ■ Displaying the Status of Hosts on a Network
    - ■ Displaying Information About Users
    - ■ Remote Login
    - ■ Remote Command Execution
    - ■ Remote Copy

8.   The Commonly Used Filters (3 H)
- ✓ sed
- ✓ awk
- ✓ tr

9.   Scripting (6 H)
- ✓ Scripts Overview
- ✓ Bash Scripting
    - ■ Create the first bash script
    - ■ Variables
    - ■ Program Control Flow Commands
    - ■ Numeric Data Processing
    - ■ The Improvement on Arithmetic Operations in bash
    - ■ The Here Document
    - ■ Interrupt   Processing
    - ■ The exec Command
    - ■ File I/O with The exec Command
    - ■ Functions
    - ■ Debug Shell Scripts
- ✓ Cshell Scripting
    - ■ Variables in C Shell
    - ■ Passing Arguments in C Shell
    - ■ Program Control Flow Commands
    - ■ Array Processing
    - ■ Interrupt Processing

10. UNIX Tools for Software Development (6 H)
- ✓ Introduction
- ✓ Creating Source Files
- ✓ Indenting C Source File
- ✓ Compiling Programs
- ✓ Handling Module-Based C software with the *make* utility
- ✓ Building Object Files into a Library
- ✓ Working with Libraries
- ✓ Version Control Utilities

	✓ Debugging and Tracing
Tools & Environment	This course will require hosts with UNIX/Linux Environment or Windows with UNIX emulator such as Cgywin.

Projects	Lab1: Quick Start with UNIX (3 H)
	Goals:
	   This lab job will help students to:
	✓ get familiar with the UNIX environment and basic UNIX operations
	Contents:
	✓ log in/out UNIX System
	✓ Change the password of student's own account
	✓ Copy a file from UNIX System to student's data traveler.
	✓ Use man, info command to get online help.
	
	Lab2: Working with UNIX (3 H)
	Goals:
	   This lab job will help students to:
	✓ get familiar with commonly used UNIX command
	✓ manage UNIX file system
	✓ work with UNIX files
	Contents:
	✓ Students are required practice the commands below:
	   ls cd pwd mkdir rmdir cp mv cat man more less whatis lp/lpr cal
	   passwd alias less head tail nl ping traceroute ifconfig wc diff uniq
	   compress uncompress gzip gunzip gzexe zcat cut paste find uuencode
	   uudecode crypt grep egrep fgrep ln tee tar sed awk tr
	   .
	Lab3: Scripting (3 H)
	Goals
	   This lab job will help students to:
	✓ understand the file redirection on UNIX
	✓ program shell scripts
	Content:
	✓ Write a shell script which accepts a file name as parameter: The script checks if file exists, and creates a directory **Backup** If file exists, copies the file to the backup director with the same name + **.bak** (if the .bak file already exists ask if you want to replace it).
	✓
	Lab4: Using Development Tools in UNIX (3 H)
	Goals:
	   This lab job will help students to:
	✓ Get familiar with UNIX developing tools
	✓ Understand how the make file works
	Content:

	✓ Students are required download a source file package which include several C source file with some errors (grammar & logical). Students should write a make file to compile these source files and run the executable file.