Northern Wyoming Community College District

Sheridan College	Gillette College
3059 Coffeen Avenue	300 West Sinclair Street
Sheridan, Wyoming 82801	Gillette, Wyoming 82718

COMMON COURSE SYLLABUS

COSC 2020 Linux Fundamentals (3 credits)

Computer Science Department

Business and Social Science Division

Effective Date: Spring 2010

Description
This course introduces the student to the Linux operating system. The student will gain actual hands-on experience in installing, configuring, and administering Linux in both a client and server environment, as well as in integrating it with other operating systems. In addition, the student will acquire the skills and knowledge necessary to negotiate a Linux based computer system by performing a variety of administrative tasks and functions inherent in using any Linux based operating system.

Prerequisites
None

Co-requisites
None

Purpose (including degree requirement fulfilled)
This course will serve as an elective in the CIS, A.S. degree, the Computer Network Administration, A.A.S degree and as an elective in the A.A.S. Computer Web Design and Internet Business degree.

Course Format
Lecture

Grading (Letter or S/U)
Letter

Minimum Student Outcomes
Upon completion of this course, the student will:
1. Planning The Implementation
   1.1. Identify the purpose of Linux machine based on predetermined customer requirements(e.g., appliance, desktop system, database, mail server)
   1.2. Identify all system hardware required and validate that it is supported by Linux (e.g., CPUs, RAM, graphics card, storage devices, NIC, modem)
   1.3. Determine what software and services should be installed (e.g., client applications for workstation, server services for desired task), check requirements and validate that is it supported by Linux
   1.4. Determine how storage space will be allocated to file systems. (e.g., partition schemes)
   1.5. Compare and contrast how major Linux licensing

schemes work (e.g., GNU/GPL, freeware, shareware, open source , closed source, artistic license)

    1.6. Identify the function of different Linux services (e.g., Apache, Squid, SAMBA, Senmail, ipchains, BIND)

    1.7. Identify strengths and weaknesses of different distributions and their packaging solutions (e.g., tar ball vs. RMP/DEB)

    1.8. Describe the functions, features, and benefits of a Linux solutions as compared with other operating systems (e.g., Linux players, distributions, available software)

    1.9. Identify how the Linux kernel version numbering works.

    1.10. Identify where to obtain software and resources.

    1.11. Determine customer resources for a solution(e.g., staffing, budget, training)

2. Installation

    2.1. Determine appropriate method of installation

    2.2. Describe the different types of Linux installation

    2.3. Select appropriate parameters for Linux installation, e.g., language time zones, keyboard, mouse.

    2.4. Select packages based on machine role, e.g. workstation, server, custom.

    2.5. Select appropriate partitions based on pre-installation choices, e.g. FDISK or third party partitioning software.

    2.6. Partition according to your pre-installation plan using fdisk, e.g. /boot, /usr, var/home, SWAP

    2.7. Configure file systems, e.g. ext2 or ext3 or REISER

    2.8. Select appropriate networking configuration and protocols, e.g. modems, Ethernet, Token-Ring.

    2.9. Select appropriate security settings, e.g. Shadow password, root password, unmask value, password limitations and password rules.

    2.10. Create users and passwords during installation.

    2.11. Install and configure Xfree86 server

    2.12. Select Video card support, e.g. chipset, memory, support resolution.

    2.13. Select appropriate monitor manufacturer and settings for custom, vertical, horizontal and refresh.

    2.14. Select the appropriate window managers or desktop environment such as KDE and GNOME.

    2.15. Explain when and why the kernel will need to be recompiled.

    2.16. Install boot loader, e.g. LILO, MBR vs. first sector of boot partition.

    2.17. Install and uninstall applications after installing the operating system, e.g. RPM, tar, gzip.

    2.18. Read the Logfiles created during installation to verify the success of the installation.

    2.19. Validates that an installed application is performing correctly in both a test and a production environment.

3. Configuration

    3.1. Reconfigure the Xwindow System with automated utilities, e.g. Xconfigurator, XF86Setup.

    3.2. Configure the client's workstation for remote access, e.g. ppp, ISDN.

3.3. Set environment variables, e.g. PATH, DISPLAY, TERM.
3.4. Configure basic network services and settings, e.g. netconfig, linuxconf; settings for TCP/IP, DNS, DHCP.
3.5. Configure basic server services, e.g. X, SMB, NIS, NFS.
3.6. Configure basic Internet services, e.g. HTTP, POP, SMTP, SNMP, FTP.
3.7. Identify when swap space needs to be increased.
3.8. Add and configure printers
3.9. Install and configure add-in hardware, e.g. monitors, modems, network interfaces, scanners.
3.10. Reconfigure boot loader such as LILO.
3.11. Identify the purpose and characteristics of configuration files like BASH, inittab, FSTAB, /etc/*.
3.12. Edit basic configuration files like BASH files, inittab, fstab.
3.13. Load, remove and edit list modules, e.g. insmod, rmmod, lsmod, modprobe.
3.14. Document the installation of the operating system, including configuration
3.15. Configure access rights, e.g. rlogin NIS, FTP, TFTP, SSH, Telnet.

4. Administration
    4.1. Create and delete users
    4.2. Modify existing users
    4.3. Create, modify and delete groups
    4.4. Identify and change file permissions, modes and types using chmod, chown and chgrp
    4.5. Manage and navigate the Linux hierarchy with /etc, /usr, /bin, /var.
    4.6. Manage and navigate the standard Linux file system
    4.7. Perform administrative tasks wile logged in as root, or by using the su command, e.g. understand commands that are dangerous to the system.
    4.8. Mount and manage file systems and devices like /mnt, /dev, du, df, mount, umount.
    4.9. Describe and use the features of the multi-user environment, e.g. virtual terminals, multiple logins.
    4.10. Use common shell commands and expressions
    4.11. Use network commands to connect to and manage remote systems, e.g. telnet, ftp, ssh, netstat, transfer files, redirect Xwindow.
    4.12. Create, extract and edit file and tape archives using tar.
    4.13. Manage run levels using init and shutdown.
    4.14. Stop, start, and restart services (Daemons) as needed, like init files.
    4.15. Create, edit and save files using vi.
    4.16. Manage and navigate the Graphical User Interface, e.g. menus, xterm.
    4.17. Program basic shell scripts using common shell commands, e.g. grep, find, cut, if.
5. System Maintenance
    5.1. Create and manage local storage devices and file systems, e.g. fsck, fdisk, mksf.

5.2. Verify user and root cron jobs and understand the function of cron.

5.3. Identify core dumps and remove or forward as appropriate

5.4. Run and interpret ifconfig.

5.5. Download and install paths and updates, e.g. packages, tgz.

5.6. Differentiate core services from non-critical services, e.g. ps, PID, PPID, init, timer.

5.7. Identify, execute and kill processes like ps, kill, killall.

5.8. Monitor system log files regularly for errors, logins, and unusual activity.

5.9. Document work preformed on a system.

5.10. Perform and verify backups and restores.

5.11. Perform and verify security best practices, e.g. passwords, physical environments.

5.12. Assess security risks like location, sensitive data, file system permissions, remove/disable unused accounts, audit system services/programs.

5.13. Set daemon and process permissions, e.g. SUID-SGID-Owner/groups.

6. Troubleshooting

6.1. Identify and locate the problem by determining whether the problem is hardware, operating system, application software, configuration or the user.

6.2. Describe troubleshooting best practices like methodology.

6.3. Examine and edit configuration files based on symptoms of a problem using system utilities.

6.4. Examine, start and stop processes based on the signs and symptoms of a problem.

6.5. Use system status tools to examine system resources and statuses like fsck, setserial.

6.6. Use system boot disk and root disk on workstation and server to diagnose and rescue file systems.

6.7. Inspect and determine cause of errors from system log files.

6.8. Use disk utilities to solve file system problems, e.g. mount and umount.

6.9. Resolve problems based on user feedback, e.g. rights, unable to login to the system, unable to print, unable to receive or transmit mail.

6.10. Recognize common errors, e.g. package dependencies, library errors, version conflicts.

6.11. Take appropriate action on boot errors, e.g. LILO, bootstrap.

6.12. Identify backup and restore errors.

6.13. Identify application failure on server, e.g. Web page, telnet, ftp, pop3 snmp.

6.14. Identify and use trouble shooting commands, e.g. locate, find, grep, ?, <, >, >>, cat, tail.

6.15. Locate troubleshooting resources and update as allowable, e.g. Web, man pages, howtos, infopages, LUGs.

6.16. Use network utilities to identify network and connectivity problems, e.g. ping, rout, traceroute, netstt, lsof.
7. Identify, Install, and Maintain System Hardware
    7.1. Identify basic terms, concepts, and functions of system components, including how each component should work during normal operation and during the boot process.
    7.2. Assure that system hardware is configured correctly prior to installation, e.g. IRQs, BIOS, DMA, SCSI setting, cabling, by identifying proper procedures for installing and configuring ATA devices.
    7.3. Assure that system hardware is configured correctly prior to installation, e.g. IRQ, BIOS, DMA, SCSI settings, cabling, by identifying proper procedures for installing and configuring SCSI and IEEE 1394 devices.
    7.4. Assure that system hardware is configured correctly prior to installation, e.g. IRQ, BIOS, DMA, SCSI settings, cabling, by identifying proper procedure for installing and configuring peripheral devices.
    7.5. Assure that system hardware is configured correctly prior to installation, e.g. IRQ, BIOS, DMA, SCSI settings, cabling, by identifying available IRQs, DMAs, and I/O addresses and procedures for device installation and configuration.
    7.6. Remove and replace hardware and accessories, e.g. cables and components, based on symptoms of a problem by identifying basic procedures for adding and removing field replaceable components.
    7.7. Remove and replace hardware and accessories, e.g. cables and components, based on symptoms of a problem by identifying common symptoms and problems associated with each component and how to trouble shoot and isolate the problems.
    7.8. Identify basic networking concepts, including how a network works.
    7.9. Identify proper procedures for diagnosing and troubleshooting ATA devices, SCSI devices, peripheral devices and core system hardware.
    7.10. Identify and maintain mobile system hardware, e.g. PCMCIA, APM.
8. Outcomes may change slightly to remain current with the Linux/Unix Certification Exam objectives.

Texts/Materials	Texts and/or materials are selected by individual instructors with Division Chair approval.
Minimum Course Requirements	1. Weekly reading assignments 2. Weekly homework Assignments 3. Weekly lab exercises 4. Weekly discussions 5. Weekly quizzes 6. A midterm and a final examination

Disability Statement   Students with disabilities who believe they may need accommodations
in this class are encouraged to contact the ADVISING OFFICE as soon
as possible to ensure such accommodations may be implemented.