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| **Program:** | **Computer Systems Technology** |
| **Course:** | **Advanced Operating Systems (COOS 291)** |
| **Course Description:** | You will learn to work with both the command line and graphical interfaces of the Linux operating system. In addition you will learn about the file system, shell programming, system and network administration. Special emphasis will be placed on learning about Linux networks and telecommunications studies. |
| **Pre-requisites:**  **Co-requisites:** | Operating Systems Fundamentals (COOS 181)  None |
| **Course Hours:**  **Credit Units:** | 75 hours (5 hours/week x 15 weeks)  5.0 credit units |
| **Student Assessment:**  **Grade/Passing Grade:**  **PLAR Method:** | Assignments (3-4) 30%  Midterm 30%  Final 40%  Overall 50%  Not yet determined |
| **Learning Resources:** | Online resources using O’Reilly (**Library -> Digital Resources -> O’Reilly**)   * Ubuntu Linux Unleashed 2021 Edition, 14th Edition * Pro Bash Programming : Scripting the GNU/Linux Shell, Second Edition * Beginning Perl Programming: From Novice to Professional |
| **Learning Outcomes:** | 1. Demonstrate competency in using Linux in both command Line and Graphical User Interface (GUI) mode. 2. Describe the Linux File System 3. Perform administrative tasks with a scripting language 4. Perform system administration 5. Perform network administration 6. Manage a network 7. Manage Web content servers 8. Perform socket-based communications 9. Configure interoperability between Linux and Windows networks |
| **Prepared/Updated by:** | **Joseph Herbert Date: January 2023** |
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| 1. **Demonstrate Competency in using Linux in both Command Line and GUI mode.** | * 1. State Unix/Linux History   2. Use a desktop presentation manager.   3. Describe and use the Shell and Command Line Utilities   4. Demonstrate the following commands:      + ls, pwd, ps, grep, who, w, vi, find, cp, mv, mkdir, rmdir, top, head, tail, more, less, cd, chmod, chown, chgrp,df   5. Demonstrate how to combine commands using pipes.   6. Describe how the shell actually works. | 1. Lecture 2. - 1.7 Lecture/Demonstration |
| Assessment Tools: |  | Hands on assignments and Exam Questions |
| **2. Describe the Linux File System** | * 1. Describe Basic Layout of File System   2. Describe how files are actually stored using Inodes and data blocks.   3. Describe how a directory is stored on a hard drive.   4. Describe the meaning of the output from a stat or istat command.   5. Describe the difference between a symbolic link and a hard link. | * 1. – 2.5 Lecture/Demonstration |
| **Assessment Tools:** |  | Hands on Assignment and Exam Questions |
| **3. Perform administrative tasks working with a Scripting Language** | * 1. Introduction to Bash      + Creating a bash Script File      + Input, Output and Throughput      + Printf      + Pipeline   2. Looping and Branching      + Exit      + Testing an Expression      + For/while loops   3. Command Line Parsing      + Quotes      + Expansions      + Parsing Options      + Commands   4. Files      + Reading a file      + Regular Expressions   5. Introduction to Perl * Use Basic Perl Syntax * Use For/While Loops in Perl * Use Basic IO   1. Describe Advanced Perl Features * Use Arrays * Use Hashes * Use Functions * Use Strings   1. Use File IO * Open Files for Reading * Open Files for Writing * Create and Delete Files * Open pipes to system calls.   1. Use Perl system Calls to create processes. * Use Fork * Use Exec * Use System * Use Wait * Use back-ticks; | 3.1 - 3.8 Lectures /Demos/Labs |
| **Assessment Tools:** |  | Hands on Assignment and Exam Questions |
| **4. Practice basic System Administration** | 1. Describe the Role of the System Administrator 2. Create and delete user and group accounts. 3. Demonstrate how to gracefully shut down the system. 4. Demonstrate how to format, partition and attach a new drive to the system. 5. Practice scheduling a batch job. 6. Demonstrate how to alter a process’s running state. 7. Demonstrate how to install new packages on a system. | 4.1 - 4.9 Lecture/Demo/Lab |
| **Assessment Tools:** |  | Hands on Assignments and Exam Questions |
| **5. Practice basic Network Administration** | 1. Practice administering a NIC 2. Demonstrate how to use a DNS (Domain Name Server). 3. Demonstrate how to attach to an LDAP (Lightweight Directory Access Protocol) server. 4. Demonstrate how to access an FTP (File Transfer Protocol) server. 5. Demonstrate how to mount a remote NFS (Network File System) directory. 6. Practice using SSH (Secure Shell) to access a remote machine. | 5.1 – 5.6 Lecture/Demo/Lab |
| **Assessment Tools:** |  | Hands on Assignment |
| **6. Manage a Network** | 1. Establish an NFS Server. 2. Create an LDAP Server. 3. Create a DNS Server 4. Assemble a network using NFS,DNS and LDAP 5. Install advanced network services 6. Configure advanced network services | 6.1 -6.6 Lecture/Demo/Lab |
| **Assessment Tools:** |  | Hands on Assignment/Exam Question |
| **7. Manage Web Content Servers** | 1. Manage an Apache Web server 2. Create an apache virtual web server 3. Implement Apache based security rules. 4. Manage a secure FTP server 5. Illustrate how to connect to a secure web server. | 7.1 – 7.5 Lecture/Demo/Lab |
| **Assessment Tools:** |  | Hands on Assignment/Exam Question |
| **8. Perform socket-based communications** | 1. Describe how sockets carry packets across a TCP/IP network 2. *Establish a Socket Server program (using Perl)* 3. *Establish a socket Client* program (using Perl) 4. Using sockets to establish a network service. | 8.1 - 8.4 Lecture/Demo/Lab |
| **Assessment Tools:** |  | Hands on Assignment/Exam Question |
| **9. Arrange Interoperability between Linux and Windows Networks.** | 1. Describe how SMB (Server Message Block) works 2. Create a SAMBA Server 3. Demonstrate (on Linux) how to map a drive to a Windows Server. 4. Demonstrate (on Windows) how to map a drive to Linux Samba server. | 9.1 - 9.4. Lecture/Demo/Lab |
| **Assessment Tools:** |  | Hands On Assignment/Exam Question |

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