

**INVER HILLS COMMUNITY COLLEGE  
INVER GROVE HEIGHTS, MINNESOTA**

**COURSE OUTLINE**

**COURSE NAME:** Server and Network Operating Systems (Server+ Certification)  
**COURSE NUMBER:** CNT 2310  
**CREDIT HOURS:** 4 hours of lecture weekly  
**DEPARTMENT:** Network and Computer Technology

**CATALOG DESCRIPTION**

**CNT 2310**

Server and Network Operating Systems (Server+ Certification)

4 credit hours – Four hours of lecture weekly; one term

Provides an intensive introduction to multi-user, multi-tasking network operating systems. Characteristics of the Linux, Windows 2000, NT, and XP network operating systems will be discussed. Students will explore a variety of topics including installation procedures, security issues, back up procedures, and remote access. Helps prepare students for Comp TIA's Server + exam.

Prerequisites: CNT 2300 or equivalent experience.

**LEARNING OBJECTIVES**

Upon completion of the course, the student will be able to:

- a. Work with Operating System Basics, Microsoft Windows, UNIX and Linux and the desktop, and basic network operating system settings.
- b. Define the benefits of networking, types of networks, networking standards, networking protocols, and LAN architectures.
- c. Configure a NIC.
- d. Define Topologies, Media Types, Devices, and WANs
- e. Define the history of TCP/IP, IP addressing, Name Resolution, and TCP/IP Protocols.
- f. Define Network Services, Remote Access Services, Directory Services, and other NOS Services.
- g. Define the Characteristics of a NOS, Windows NT/2000, Windows XP, Linux, Novell, and Macintosh Systems.
- h. Describe the installation and Boot Process and how to troubleshoot.
- i. Install Windows 2000 Professional and manage user accounts, file systems, and services.
- j. Install Linux and manage user accounts, file systems, and services.
- k. Define Advanced NOS Administration.
- l. Describe Network Security.

**DIVISION OF SUBJECT MATTER**

<b><u>Main Topic</u></b>	<b><u>Time Allocation</u></b>
1.0 Operating System Fundamentals	5%
2.0 Introduction to Networking	5%
3.0 Physical Components of a Network	5%
4.0 TCP/IP Networking	10%
5.0 Overview of Network Services	7%
6.0 Introduction to Network Operating Systems	7%
7.0 Installations and Boot Process Overview	7%
8.0 Windows 2000 Professional	7%
9.0 Linux Installation Procedures	7%

**INVER HILLS COMMUNITY COLLEGE  
INVER GROVE HEIGHTS, MINNESOTA**

10.0 Linux Administration	8%
11.0 Advanced NOS Administration	8%
12.0 Installing and Maintaining Hardware in Linux	8%
13.0 Troubleshooting the Operating System	8%
14.0 Network Security	8%

**DETAILED COURSE OUTLINE**

1.0 Operating System Fundamentals

1.1. Network Operating System Basics

- 1.1.1. Overview of PC operating systems
- 1.1.2. PCs and computer networks
- 1.1.3. The kernel
- 1.1.4. The user interface
- 1.1.5. The file system
- 1.1.6. Common desktop operating systems  
Worksheet: Operating System Basics

1.2. Microsoft Windows

- 1.2.1. MS-DOS
- 1.2.2. Microsoft Windows 3.1
- 1.2.3. Windows 9x
- 1.2.4. Windows NT and Windows 2000
- 1.2.5. Windows XP
- 1.2.6. Windows GUI
- 1.2.7. Windows CLI
- 1.2.8. Windows Control Panel  
Worksheet: Microsoft Windows Basics

1.3. UNIX and Linux on the Desktop

- 1.3.1. Origins of UNIX
- 1.3.2. Origins of Linux
- 1.3.3. Linux/UNIX GUI
- 1.3.4. Linux/UNIX CLI
- 1.3.5. Linux and UNIX system configuration tools  
Worksheet: UNIX and Linux on the Desktop

1.4. Network Operating Systems Overview

- 1.4.1. Common network operating systems
- 1.4.2. Windows and Linux NOS Comparison; describe the licensing methods for Linux & Windows
- 1.4.3. The client-server model
- 1.4.4. Evaluating customer resources and requirements; describe support options; given a customer scenario with number of users & applications stated, choose vendor recommended OS; given a customer scenario, choose appropriate features that address issue

Summary

2.0 Introduction to Networking

2.1. Benefits of Networking

- 2.1.1. File, print, and application services
- 2.1.2. Mail services
- 2.1.3. Directory and name services
- 2.1.4. The Internet  
IT Essentials II – Network Operating Systems (Server+)  
Course Syllabus Page 6
- 2.1.5. Network administration

2.2. Types of Networks

**INVER HILLS COMMUNITY COLLEGE  
INVER GROVE HEIGHTS, MINNESOTA**

- 2.2.1. Overview
- 2.2.2. Local-area networks (LANs)
- 2.2.3. Wide-area networks (WANs)
- 2.2.4. Peer-to-peer networks
- 2.2.5. Client/server networks  
Worksheet: Types of Networks
- 2.3. Networking Protocols
  - 2.3.1. Protocol suite
  - 2.3.2. TCP/IP  
Worksheet: The OSI Reference Model
  - 2.3.3. Proprietary versus open standards  
Worksheet: Proprietary and Open Standards Comparison
- 2.4. LAN Technologies
  - 2.4.1. Ethernet
  - 2.4.2. DSL
  - 2.4.3. Cable modems  
Worksheet: Network Protocols

Summary

3.0 Physical Components of a Network

- 3.1. Configuring a Network Interface Card
  - 3.1.1. What is a NIC?
  - 3.1.2. Setting the IP address; describe the differences between DHCP & Static IP addressing; given a screenshot, describe the properties of network settings
  - 3.1.3. DHCP servers; describe the process of DHCP for ip assignment
  - 3.1.4. Domain Name System
  - 3.1.5. Default gateway
- 3.2. Topologies
  - 3.2.1. The network topology
  - 3.2.2. Physical versus logical topology
  - 3.2.3. Identifying Network Topologies; describe the different networking topologies and devices  
Worksheet: Network Topologies
- 3.3. Media Types
  - 3.3.1. Networking media
  - 3.3.2. Twisted-pair cable  
Worksheet: Twisted Pair Cabling
  - 3.3.3. Fiber-optic cable
  - 3.3.4. Wireless  
Worksheet: Physical Media Types
- 3.4. Network Devices
  - IT Essentials II – Network Operating Systems (Server+)  
Course Syllabus Page 7
  - 3.4.1. Hubs and repeaters
  - 3.4.2. Bridges and switches
  - 3.4.3. Routers  
Worksheet: Network Devices

Summary

4.0 TCP/IP Networking

- 4.1. History of TCP/IP
  - 4.1.1. Origins and growth of TCP/IP
  - 4.1.2. The TCP/IP network model  
Worksheet: The TCP/IP Network Model
  - 4.1.3. CP/IP and network operating systems

**INVER HILLS COMMUNITY COLLEGE  
INVER GROVE HEIGHTS, MINNESOTA**

- 4.2. IP Addressing
  - 4.2.1. IPv4 addressing  
Lab: Configuring Static TCP/IP settings in Linux
  - 4.2.2. IPv4 addressing overview  
Worksheet: IPv4 Addressing Overview
  - 4.2.2. Class A addresses
  - 4.2.3. Class B addresses
  - 4.2.4. Class C addresses
  - 4.2.5. Class D and E addresses
  - 4.2.6. The IPv4 address crisis
  - 4.2.7. Subnetting  
Worksheet: Subnetting
- 4.3. Name Resolution
  - 4.3.1. Overview of name resolution
  - 4.3.2. Hostnames and host tables; describe the purpose of machine & network identifications
  - 4.3.3. The domain name system; describe the purpose of machine & network identifications
  - 4.3.4. Name services and the NOS
  - 4.3.5. WINS
- 4.4. TCP/IP Protocols
  - 4.4.1. Overview of TCP/IP protocols
  - 4.4.2. Address Resolution Protocol (ARP)
  - 4.4.3. Internet Control Message Protocol (ICMP); describe the different TCP/IP utilities
  - 4.4.4. Transmission Control Protocol (TCP)
  - 4.4.5. User Datagram Protocol (UDP)
  - 4.4.6. DHCP service; describe the process of DHCP for IP assignment
  - 4.4.7. Hypertext Transport Protocol (HTTP)
  - 4.4.8. File Transfer Protocol (FTP)
  - 4.4.9. Telnet
  - 4.4.10. SMTP
  - 4.4.11. POP3
  - 4.4.12. IMAP

Summary

IT Essentials II – Network Operating Systems (Server+)  
Course Syllabus Page 8

- 5.0 Overview of Network Services
  - 5.1. Network Services
    - 5.1.1. An Introduction to Network/NOS Services  
Worksheet: Network/NOS Services
  - 5.2. Remote Administration and Access Services
    - 5.2.1. What is remote access?
    - 5.2.2. Telecommuting
    - 5.2.3. Mobile users
    - 5.2.4. Terminal emulation services
    - 5.2.5. Telnet Services
    - 5.2.6. Configuring remote access for a client
    - 5.2.7. Controlling remote access rights
    - 5.2.8. Remote administration to a Linux system
  - 5.3. Directory Services
    - 5.3.1. What is a directory service?
    - 5.3.2. Directory service standards
    - 5.3.3. Windows 2000 active directory  
Worksheet: Windows 2000 Active Directory
    - 5.3.4. Network Information Service (NIS); describe NIS for Linux

**INVER HILLS COMMUNITY COLLEGE  
INVER GROVE HEIGHTS, MINNESOTA**

Lab: Configuring Linux as a NIS Client

5.4. Other NOS Services

- 5.4.1. Mail
- 5.4.2. Printing
- 5.4.3. File sharing
- 5.4.4. FTP (File Transfer)
- 5.4.5. Web services
- 5.4.6. Intranet
- 5.4.7. Extranet
- 5.4.8. Automating task with script services
- 5.4.9. Domain Name Service (DNS)
- 5.4.10. Dynamic Host Configuration Protocol (DHCP); describe the process of DHCP for IP assignment; describe the differences between DHCP & Static IP addressing
- 5.4.11. Domains

Summary

6.0 Introduction to Network Operating Systems

6.1. Characteristics of a Network Operating System

- 6.1.1. Overview of NOS characteristics
- 6.1.2. Differences between PCs and a NOS
- 6.1.3. Multi-user, multitasking, and multiprocessor systems
- 6.1.4. NOS server hardware
- 6.1.5. Choosing a NOS; given a list of applications that need to be supported, determine the appropriate OS
- 6.1.6. Types of NOS's  
IT Essentials II – Network Operating Systems (Server+)  
Course Syllabus Page 9  
Worksheet: Characteristics of a Network Operating System

6.2. Windows

- 6.2.1. Windows terminology
- 6.2.2. Windows NT 4.0
- 6.2.3. Windows 2000 and XP Operating Systems  
Worksheet: Windows NT/2000/XP
- 6.2.4. Windows 2000 and 2003 Server Operating Systems; describe the features and benefits of Windows 2000 Server

6.3. Linux

- 6.3.1. History of Linux; describe the features and benefits of Linux
- 6.3.2. What is UNIX?
- 6.3.3. Linux Operating Systems; describe the different distribution options of each OS; explain the different methods Linux products use for distribution  
Lab: Linux OS Fundamentals
- 6.3.4. Linux clients  
Worksheet: Linux

6.4. Determining Software Requirements for a Linux NOS

- 6.4.1. Workstation software and programs; describe the licensing methods for Linux
- 6.4.2. Server software and programs
- 6.4.3. Additional software and programs
- 6.4.4. Verifying software compatibility; describe compatibility issues between Linux & Microsoft; describe security issues in a multi-vendor environment

Summary

7.0 Installations and Boot Process Overview

7.1. Preparing for the Installation

**INVER HILLS COMMUNITY COLLEGE  
INVER GROVE HEIGHTS, MINNESOTA**

- 7.1.1. Installing NOS
  - 7.1.2. Planning the system
  - 7.1.3. Planning hardware installation  
Worksheet: Planning the Installation; determine factors that effect hardware choice
  - 7.1.4. Server hardware components  
Worksheet: Server Components
  - 7.1.5. Hardware requirements  
Worksheet: Hardware Requirements; determine if existing hardware will support chosen OS; given different hardware options determine what is necessary to support the OS; given a customer scenario, determine the hardware needs based from application & data requirements
  - 7.1.6. Creating a hardware inventory
  - 7.1.7. Identifying hardware using Device Manager; use Device Manager Console to install or update device drivers  
Lab: Using Device Manager in Windows 2000 Server  
IT Essentials II – Network Operating Systems (Server+)  
Course Syllabus Page 10
  - 7.1.8. Checking hardware compatibility lists; describe the purpose of the HCL; describe how to determine if hardware is adequate  
Lab: Using the HCL  
Worksheet: File System
  - 7.1.9. Verifying the network; describe the different TCP/IP utilities
  - 7.2. The Installation Process
    - 7.2.1. Installation media
    - 7.2.2. BIOS settings
    - 7.2.3. The Installation program
    - 7.2.4. Disk partitions; describe the function of a disk partition; describe the benefits of using disk partitions; explain how Linux partitions as structured
    - 7.2.5. Partitioning a disk; explain the usage of the FIPS utility
    - 7.2.6. Swap files; describe the required partition types, including swap  
Lab: Adding Swap File Space in a Linux System
    - 7.2.7. Formatting the disk; describe the differences between the various file system types; given a scenario, choose the appropriate file system type
    - 7.2.8. Creating initial administrative accounts
    - 7.2.9. Completing the installation; given an output/screenshot, interpret if install has been successful
  - 7.3. The Boot Process
    - 7.3.1. The steps of the boot process; identify the sequence of boot order
    - 7.3.2. Basic files required
    - 7.3.3. BIOS interaction
    - 7.3.4. Detailed steps of the boot process; given a log file, determine possible boot problems  
Lab: How Does a Linux OS Boot?
    - 7.3.5. The Linux boot process; explain the difference between LILO & Grub  
Worksheet: The Boot Process  
Worksheet: The Linux Boot Process  
Lab: Installing the GRUB boot loader
  - 7.4. Troubleshooting NOS Installation
    - 7.4.1. Unable to boot from Installation media
    - 7.4.2. Problems during the installation process
    - 7.4.3. Post-installation problems
- Summary
- 8.0 Windows 2000 Professional
- 8.1. Installation
    - 8.1.1. Installing Windows 2000  
IT Essentials II – Network Operating Systems (Server+)

**INVER HILLS COMMUNITY COLLEGE  
INVER GROVE HEIGHTS, MINNESOTA**

Course Syllabus Page 11

Lab: Installation Demonstration of Windows 2000

Worksheet: Installing the OS; describe the licensing methods for Windows; successfully install a Windows 2000 Server; describe the procedure to load the OS; configure machine name and workgroup name; describe the purpose of machine & network identifications

- 8.1.2. Installation of OS add-on options; describe the procedure for updating the OS; use ipconfig to determine existing IP settings

Lab: Configuring an IP Address and Default Gateway in Windows 2000; configure network settings

8.2. Administrator/User Interface

- 8.2.1. Log on procedures

Lab: Log on to Windows 2000

- 8.2.2. Graphic user interface (GUI)

Lab: Using the Windows 2000 GUI

- 8.2.3. Command-line interface (CLI)

Lab: Using the Windows 2000 CLI

- 8.2.4. Windows Explorer navigation

Lab: Navigate the Windows 2000 File System with Windows Explorer and My Computer

8.3. User Accounts

- 8.3.1. Adding users

Lab: Adding Users in Windows 2000

- 8.3.2. Managing user accounts

Lab: Manage User Accounts in Windows 2000

Worksheet: User Accounts

- 8.3.3. Functions and Permissions of the Administrator Account; explain the functions and permissions of the Administrator

8.4. Managing the File System

- 8.4.1. Creating and sharing folders; use Windows Explorer to create a folder; use Windows Explorer to create a file

Lab: Creating Files and Directories using Windows 2000

- 8.4.2. Creating groups and adding users; describe the process for adding users & groups; use Computer Management console to add and remove from a user to a group; use Computer Management to change a user password

Lab: Creating Groups in Windows 2000

- 8.4.3. Passwords and permissions; identify file/folder permissions; describe the differences in permissions levels; given a scenario, change a users permission level; describe the various level of user file permissions

Lab: Assigning Permissions in Windows 2000

8.5. Services

IT Essentials II – Network Operating Systems (Server+)

Course Syllabus Page 12

- 8.5.1. Hypertext Transfer Protocol (HTTP); describe the method for installing web services; given a screenshot of IIS installation screen, determine the appropriate options; install Web services

Lab: Configure HTTP Services on Windows 2000

- 8.5.2. File Transfer Protocol (FTP); obtain file from an FTP server

Lab: Configure FTP Services on Windows 2000

- 8.5.3. Telnet

Lab: Configure Telnet on Windows 2000

- 8.5.4. Stopping and Starting Services in Windows; describe the procedure for starting/stopping services; describe the different options for starting/stopping services; given a screenshot of running services, describe the status of a service; describe the process for changing the starting status of a service

Lab: Stopping and Starting Services in Windows 2000

- 8.5.5. E-mail Server/Client relationship

**INVER HILLS COMMUNITY COLLEGE  
INVER GROVE HEIGHTS, MINNESOTA**

- 8.5.6. Printing in Windows 2000; describe the steps required to install a printer; given a scenario, determine if network printing should be supported
- 8.5.7. Scripts; describe ways to automate Windows functions  
Lab: Write a Script in Windows 2000

Summary

9.0 Linux Installation Procedures

9.1. Pre-Installation Tasks

- 9.1.1. The boot method
- 9.1.2. Installation media; describe the procedure to load the OS
- 9.1.3. Selecting the appropriate parameters for installation; given a scenario, choose the appropriate file system type
- 9.1.4. Creating the Linux file system; describe the differences between the file systems
- 9.1.5. Selecting packages to install
- 9.1.6. Linux Multimedia

9.2. Installing and Configuring Linux

- 9.2.1. Linux hardware requirements; successfully install and configure a Linux server  
Lab: Installation of Linux
- 9.2.2. Starting the installation; describe the procedure to load the OS
- 9.2.3. Configuring appropriate security settings; explain the reason why add an additional administrator account other than Root
- 9.2.4. Configuring network settings; identify the IP configuration files; describe commands required to make identification & IP setting  
IT Essentials II – Network Operating Systems (Server+)  
Course Syllabus Page 13 changes; describe the commands required to view the identification & IP settings  
Lab: Configuring Network Settings
- 9.2.5. Other configurations and settings

9.3. X Server

- 9.3.1. Video card chipset
- 9.3.2. X server options
- 9.3.3. Configuring X server  
Lab: Configuring X Server
- 9.3.4. Hardware configurations

9.4. Post-Installation Configuration and Tasks

- 9.4.1. Post-installation of applications and programs; describe the procedure for updating the OS; describe various commands needed to update the OS; describe the relevance of patches for updates; describe the purpose of Package Manager; describe how to obtain system updates for Linux  
Lab: Post-Installation of Applications and Programs
- 9.4.2. Creating Achieves and Basic make file changes; describe tar and its uses; describe gzip and its uses; use gunzip & tar to extract files from a \*.tar.gz file
- 9.4.3. Installing and reconfiguring the boot loader; given a log file, determine possible boot problems; describe the contents of fstab
- 9.4.4. Kernel issues  
Lab: Linux Kernel Management
- 9.4.5. Environment variables
- 9.4.6. Verifying proper application functioning and performance

Summary

10.0 Linux Administration

10.1. User Interface Administrator

- 10.1.1. Log in procedures  
Lab: Logging into Linux

**INVER HILLS COMMUNITY COLLEGE  
INVER GROVE HEIGHTS, MINNESOTA**

- 10.1.2. GUI interface; describe the different Windows managers; describe the different shells (desktop environments)  
Lab: Using the Linux GUI (X Window)
- 10.1.3. CLI interface; explain how to research problem solutions using the man files; navigate the file structure using command line interface  
Lab: The CLI Interface
- 10.1.4. The Linux shells; describe the different shells (desktop environments)  
Lab: The Linux bash and C Shells  
Worksheet: The Linux Shells
- 10.1.5. VI Editor  
IT Essentials II – Network Operating Systems (Server+)  
Course Syllabus Page 14; use VI to edit a file  
Lab: Using the Linux vi Editor  
Worksheet: The vi Editor
- 10.1.6. Awk  
Lab: Awk
- 10.2. User Accounts and Group Accounts
  - 10.2.1. User and group accounts in a Linux environment; explain the functions and permissions of Root; define group concept in Linux
  - 10.2.2. Adding and Removing User Accounts; use CLI to add, remove, edit, and delete user & group settings; explain the contents of the /etc/passwd & /etc/group  
Lab: Adding Users in Linux
  - 10.2.3. Managing user accounts; given permissions output, interprets the users right & permissions  
Lab: Managing User Account and Passwords
  - 10.2.4. Creating groups and adding users to groups; explain SUID & GUID  
Lab: Creating Groups in Linux
- 10.3. Files System and Services Management
  - 10.3.1. Creating/sharing directories; describe process for creating files & directories; create a file or directory  
Lab: Creating Directories in Linux
  - 10.3.2. Using the find and grep commands; describe the functions of commands used for file management
  - 10.3.3. Passwords and permissions; explain the functions and permissions of Root; identify user level and root level properties; explain commands used to change permissions; describe process for determining current permissions; given permissions output, interprets the users right & permissions; describe the process for assigning permissions to files & directories
  - 10.3.4. Mounting and managing files systems; use the mount & un-mount commands to examine the state of file system status; move a file or directory; use mount & un-mount to make a file, directory, or disk available
  - 10.3.5. File system configuration files; describe the functions of commands used for file management; describe the contents of fstab
  - 10.3.6. Managing runlevels; match the service to the correct run level; describe the differences between run levels  
Lab: Managing Runlevels
  - 10.3.7. Documenting a Linux system configuration
- 10.4. Daemons
  - 10.4.1. Introduction to Linux daemons
  - 10.4.2. Starting, stopping, and restarting daemons  
IT Essentials II – Network Operating Systems (Server+)  
Course Syllabus Page 15; describe process for determining which services/daemons are running; issue a command to start or stop a service; describe the methods for stopping a service
  - 10.4.3. HTTP; describe the services Apache offers; describe the process for obtaining Apache; install Apache  
Lab: HTTP Apache Web Server

**INVER HILLS COMMUNITY COLLEGE  
INVER GROVE HEIGHTS, MINNESOTA**

- 10.4.4. FTP; describe the process for enabling FTP services; explain the usage of FTP; obtain file from an FTP server  
Lab: Configuring FTP Services in Linux
- 10.4.5. Telnet  
Lab: Configuring Telnet in Linux
- 10.4.6. Server Message Block (SMB) protocol; create a SAMBA server so that Windows clients can use file & print services; describe the services SAMBA offers  
Lab: Creating a Samba Server
- 10.4.7. NFS (Network File System)
- 10.4.8. Mail client
- 10.4.9. Printing in a Linux Environment; given the contents of a printer configuration file, modify it to support additional printers; describe the steps required to install a printer
- 10.4.10. Scripts; describe the methods to automate system functions  
Lab: Writing a Script File in Linux

Summary

11.0 Advanced NOS Administration

11.1. Backups

- 11.1.1. Overview of backup methods  
Lab: Backing up with Linux  
Lab: Backing up with Windows

11.2. Drive Mapping

- 11.2.1. What is drive mapping?
- 11.2.2. Mapping drives in Windows networks
- 11.2.3. Mapping drives in Linux networks

11.3. Partition and Processes Management

- 11.3.1. Using fdisk, mkfs, and fsck; explain the role of partitions in conjunction with system security
- 11.3.2. Managing system processes with cron jobs
- 11.3.3. Core dumps
- 11.3.4. Assigning permissions for processes; use the ps command to determine current process status; given permissions output, interprets the users right & permissions; describe process relationship (parent, child, etc.)  
IT Essentials II – Network Operating Systems (Server+)  
Course Syllabus Page 16  
Lab: Managing Processes

11.4. Monitoring Resources

- 11.4.1. Disk management; use the du, df, and top commands to determine resource utilization
- 11.4.2. Memory usage; describe methods to determine system performance
- 11.4.3. CPU usages; describe methods to determine system performance
- 11.4.4. Reviewing daily logs; describe the contents of the userlog files; describe the contents of Syslog  
Lab: Syslog
- 11.4.5. Checking resource usage on Windows 2000 and Windows XP; use task manager to identify process problems; use task manager to terminate non-responsive processes; use task manager to determine current processor utilization; describe methods to determine system performance  
Lab: Checking Resource Usage on Windows 2000
- 11.4.6. Checking resource usage on Linux; describe the contents of security log; describe the contents of event log  
Lab: Checking Resource Usage on Linux

11.5. Analyzing and Optimizing Network Performance

- 11.5.1. Key concepts in analyzing and optimizing network performance; describe the differences between core processes and non-critical processes; describe methods to determine system performance
- 11.5.2. Bottlenecks; describe the differences between core processes and non-critical processes  
Worksheet: Bottlenecks
- 11.5.3. Baselines

**INVER HILLS COMMUNITY COLLEGE  
INVER GROVE HEIGHTS, MINNESOTA**

Worksheet: Baselines

- 11.5.4. Determining Internet connection speed
  - 11.5.5. Networking monitoring software; use NetMon to view network performance
- Lab: Network Monitor

Summary

12.0 Installing and Maintaining Hardware in Linux

12.1. Hardware Terms, Concepts, and Components

- 12.1.1. Overview of hardware components
  - 12.1.2. Central processing unit (CPU)
  - 12.1.3. Video hardware
  - 12.1.4. Miscellaneous hardware and components
- Lab: Using Device Manager in Windows 2000 Server
- 12.1.5. Hardware monitoring devices
- Lab: Using the HCL

12.2. Hardware Installation, Configuration, and Maintenance

IT Essentials II – Network Operating Systems (Server+)  
Course Syllabus Page 17

- 12.2.1. Locating hardware drivers for Linux
  - 12.2.2. Configuring hardware in a Linux system; explain how to configure a new HDD; make changes to /etc/fstab to
  - 12.2.3. accommodate new HDD; use fdisk to partition new HDD
  - 12.2.4. Linux kernel modules
- Lab: Updating the Server's Operating System and Hardware

12.3. Checking and Confirming Hardware Configuration

- 12.3.1. Power cables
- 12.3.2. IRQ, DMA, and I/O settings
- 12.3.3. EIDE devices
- 12.3.4. SCSI devices
- 12.3.5. BIOS settings
- 12.3.6. Diagnosing and troubleshooting devices
- 12.3.7. Peripheral devices
- 12.3.8. Core system hardware

12.4. Laptop and Mobile Devices

- 12.4.1. Power management
- 12.4.2. PC card devices

Summary

13.0 Troubleshooting the Operating System

13.1. Identifying and Locating Symptoms and Problems

- 13.1.1. Hardware problems
- 13.1.2. Kernel problems
- 13.1.3. Application software
- 13.1.4. Configuration
- 13.1.5. User error
- 13.1.6. Using system utilities and system status tools; use the ps command to determine current process status
- 13.1.7. Unresponsive programs and processes; use the ps command to determine current process status; given a ps output, identify possible problems; describe process relationship (parent, child, etc.)
- 13.1.8. When to start, stop, or restart a process; given a ps output, identify possible problems; describe the methods
- 13.1.9. for stopping a process
- 13.1.10. Troubleshooting persistent problems
- 13.1.11. Examining log files; describe the contents of syslog

**INVER HILLS COMMUNITY COLLEGE  
INVER GROVE HEIGHTS, MINNESOTA**

- 13.1.12. The dmesg command
- 13.1.13. Troubleshooting problems based on user feedback
- 13.2. LILO Boot Errors
  - 13.2.1. Error codes; given a scenario, determine the cause of the boot problem; match an error code with
  - 13.2.2. corresponding problem.
  - 13.2.3. Booting a Linux system without LILO; given a scenario, determine problems with LILO & Bootloader  
IT Essentials II – Network Operating Systems (Server+)  
Course Syllabus Page 18
  - 13.2.4. Emergency boot system; describe process for creating a boot disk after install has been completed
  - 13.2.5. Using an emergency boot disk in Linux; describe process for creating a boot disk after install has been completed; use an emergency boot disk to restart system
- 13.3. Recognizing Common Errors
  - 13.3.2. Various reasons for package dependencies problems
  - 13.3.3. Solutions to package dependencies problems
  - 13.3.4. Backup and restore errors
  - 13.3.5. Application failure on Linux servers
- 13.4. Troubleshooting Network Problems
  - 13.4.1. Loss of connectivity
  - 13.4.2. Operator error
  - 13.4.3. Using TCP/IP utilities; given output from tracert, explain possible problems; describe the different TCP/IP utilities; explain function of ARP command; given an unsuccessful ping, explain the possible problem; use Netstat to determine IP problems; use ipconfig to determine existing IP settings; use nbtstat to determine misc. other settings  
Worksheet: Using TCP/IP Utilities
  - 13.4.4. Problem-solving guidelines
  - 13.4.5. Windows 2000 diagnostic tools  
Worksheet: Windows 2000 Diagnostic Tools

Summary

14.0 Network Security

- 14.1. Developing a Network Security Policy
  - 14.1.1. Accessing security needs
  - 14.1.2. Acceptable use policy
  - 14.1.3. Username and password standards; describe the password default rules; given a list of possible password, determine which ones meet user policies; describe best practices for setting a password
  - 14.1.4. Virus protection standards; explain the process of keeping the virus files updated
  - 14.1.5. Online security resources
- 14.2. Threats to Network Security
  - 14.2.1. Overview: Internal/external security; describe common threats Against an OS
  - 14.2.2. Security vulnerabilities within Linux services; describe the security weakness an OS
  - 14.2.3. Outside threats
  - 14.2.4. Denial of Service (DoS)  
IT Essentials II – Network Operating Systems (Server+)  
Course Syllabus Page 19
  - 14.2.5. Distributed Denial of Service (DDoS)
  - 14.2.6. Well known exploits
  - 14.2.7. Inside threats  
Worksheet: Threats to Network Security
- 14.3. Implementing Security Measures
  - 14.3.1. File encryption, auditing, and authentication; given a threat scenario, choose appropriate Linux option or program to address; describe file security; describe methods of security auditing available

**INVER HILLS COMMUNITY COLLEGE  
INVER GROVE HEIGHTS, MINNESOTA**

- 14.3.2. Intrusion Detection Systems; given a threat scenario, choose appropriate Linux option or program to address; describe the features and functions of an IDS
  - 14.3.3. IP security; given a threat scenario, choose appropriate Linux option or program to address
  - 14.3.4. Secure Sockets Layer (SSL); given a threat scenario, choose appropriate Linux option or program to address
  - 14.3.5. E-mail security; given a threat scenario, choose appropriate Linux option or program to address
  - 14.3.6. Public/private key encryption  
Worksheet: Implementing Security Measures; given a threat scenario, choose appropriate Linux option or program to address
  - 14.4. Applying Patches and Upgrades
    - 14.4.1. Finding patches and upgrades
    - 14.4.2. Selecting patches and upgrades
    - 14.4.3. Applying patches and upgrades; describe the use of the automatic Windows Update client  
Lab: Windows Update
  - 14.5. Firewalls
    - 14.5.1. Introduction to firewalls and proxies; describe the features of firewalls
    - 14.5.2. Packet filtering  
Worksheet: DHCP and Firewalls
    - 14.5.3. Firewall placement
    - 14.5.4. Common firewall solutions
    - 14.5.5. Using an NOS as a firewall
- Summary

**TEXTBOOKS**

**TITLE:** IT Essentials II: Network Operating Systems Companion Guide (Cisco Networking Academy Program)  
**AUTHOR:** Cisco Networking Academy Program  
**PUBLISHER:** Cisco Press  
**ISBN:** 1587130971

**TITLE:** IT Essentials II: Network Operating Systems Lab Companion (Cisco Networking Academy Program)  
**AUTHOR:** Cisco Networking Academy Program  
**PUBLISHER:** Cisco Press  
**ISBN:** 1587130963