

**Common Course Outline**  
DCOM 259  
RedHat Linux System Administration  
4 Semester Hours

**The Community College of Baltimore County**

**Description**

This course is designed for IT students and professionals who are users of Linux who want to build skills in Systems Administration on Red Hat Enterprise Linux, to a level where they can attach and configure a workstation on an existing network as well as setup and configure RedHat Linux Enterprise servers. This course provides intensive hands-on training on Red Hat Enterprise Linux 3 and prepares students for RHCT Certification Examination, a realistic performance-based lab exam that tests the System Administrator's actual ability to install, configure, troubleshoot, and attach a new Red Hat Linux system to an existing production network.

This is the second of a two course sequence designed to prepare the student for the highly valued RHCT Certification Examination.

Prerequisite: CINS 244 (RedHat Linux Core Essentials) or consent of Program Director

**Overall Course Objectives**

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

1. Show proficiency in the installation and configuration RedHat Linux Enterprise Operating Systems and advanced installer options including creation of Anaconda Kick Start files, GRUB Stage 2 Installer files, and Network based installations
2. Describe and configure USB, PCI, and other "Hot-Pluggable devices
3. Install, partition, configure, and mount IDE, SCSI, ISO9660, NFS, Samba, and other filesystems
4. Performance tune devices and filesystems using various performance monitoring and tuning tools
5. Describe and initiate various runlevels
6. Manage system users, groups, and passwords and describe, configure, test, and troubleshoot user authentication mechanisms
7. Manage network configuration, IP routing, gateways, DHCP clients, and DNS clients and servers
8. Diagnose network problems using network diagnostic tools
9. Install and configure CUPS print system and web print reporting
10. Setup and monitor local and remote system logging

11. Install and maintain Operating System and Application packages using RPM package management tools
12. Configure, start, and stop kernel services
13. Setup and manage filesystem quotas, software and hardware RAIDS, and Logical Volume Manager
14. Setup and configure X-Window Graphical User Interface
15. Display proficient use of tools and utilities to diagnose problems with all the systems mentioned above

## **Major Topics**

### I. Hardware, Device Configuration, and Installation

1. Hardware Compatibility and Resources
2. CPU and Memory Support
3. Filesystem Device Nodes
4. System and Hotswappable Bus Support
5. Laptops
6. Block Devices and Filesystem Schemes
7. Red Hat Installer Features
8. Red Hat Linux Installation
9. Partitioning Hard Drives
10. Configuring Software RAID at Installation
11. Configuring Flexible Filesystems with LVM
12. Network Configuration and Firewall Setup
13. Package Selection
14. Validating the Installation
15. Serial Console Installation
16. Noprobe Mode
17. Driver Disks
18. Post-Install Configuration
19. **Hands-on Lab:** Installing Red Hat Linux

### II. Filesystem Management

1. Creating and Managing Partitions
2. Filesystem Basics and Attributes
3. Filesystem Creation
4. Ext3: Journaling for Ext2 Filesystems
5. The Filesystem Hierarchy
6. Mount options and configuration
7. Connecting to Network Resources with NFS and SMB/CIFS
8. Unmounting Filesystems
9. The Auto-Mounter
10. Swap partitions
11. Filesystem Maintenance
12. Determining Filesystem Usage
13. Adding a Drive

14. **Hands-on Lab:** Creating a New Filesystem, Using autofs and Adding Swap

### III. System Initialization and Services

1. The Boot Sequence
2. BIOS Initialization
3. The Boot Loader
4. Kernel Initialization
5. init Initialization
6. Run levels
7. Daemon Processes
8. The rc.sysinit Script
9. System V run levels
10. The rc.local Script
11. Virtual Consoles
12. System Shutdown and Reboot
13. Controlling Services
14. **Hands-on Lab:** Managing Startup

### IV. User Administration

1. User Policy Considerations
2. The User Account Database
3. Adding a New User Account
4. Modifying/Deleting Accounts
5. Password Aging Policies
6. Authentication Configuration
7. NIS Configuration
8. Group Administration
9. Switching Accounts
10. File Ownership
11. Linux File Permission
12. SUID / SGID Executables
13. The Sticky Bit and Setgid Access Mode
14. Default File Permissions
15. User Private Groups
16. Filesystem Quota Setup and Administration
17. **Hands-on Lab:** User and Group Administration, Creating Quotas, Joining a NIS Domain and Automounting home directories

### V. Network Configuration

1. Network Device Recognition
2. Network Interfaces
3. Address Resolution Protocol
4. Bringing Network Interfaces Up and Down
5. Interface Configuration Files
6. Configuration Utilities
7. Multiple NICs
8. Binding Multiple IP Addresses
9. DHCP/BOOTP
10. Allowing User Control of Network Interfaces

11. Basic IP Routes
12. System Default Route
13. IP Forwarding
14. Global Network Parameters
15. Name Resolution
16. DNS Client Configuration
17. DNS and Network Diagnostics and Troubleshooting
18. **Hands-on Lab:** Static Network Settings

## VI. System Administration Tools

1. Using the Alternatives System
2. The Print System User Interface
3. CUPS Printing System Configuration
4. CUPS Queue Management
5. Task Automation With at and cron
6. Controlling Access to Task Automation
7. crontab format
8. System crontab Files
9. Using tmpwatch
10. Configuring, Maintaining and Monitoring System Logs
11. Managing the whatis Database
12. System Monitoring and Process Control
13. Tape Backups
14. Archiving with tar, dump/restore, and cpio
15. Remote Backups
16. **Hands-on Lab:** System Administration Tools

## VII. RPM, Boot Loaders, and Kickstart

1. Introduction to the RPM Package Manager
2. Installing and Removing Software with RPM
3. Installing Kernel Errata
4. RPM Queries and Verification
5. RPM Utilities and Features
6. Red Hat Network in the Enterprise
7. Red Hat Network Registration
8. The up2date utility
9. Remote Administration
10. Boot Loader Components
11. GRUB and grub.conf
12. Starting the Boot Process
13. Multiboot Systems
14. Configuring a Red Hat Enterprise Linux Network Installation Server
15. Using Kickstart to Automate Installation
16. The Kickstart Configuration File
17. **Hands-on Lab:** Using Kickstart, RPM, Installing Kernel Errata, Booting Into a Maintenance Runlevel

## VIII. Kernel Services and Configuration

1. Kernel Modules and Their Configuration

2. The /proc filesystem
  3. /proc/sys configuration with sysctl
  4. Software RAID Configuration and Recovery
  5. Flexible Filesystems with LVM
  6. Using LVM to Create Snapshot Logical Volumes
  7. **Hands-on Lab:** RAID Creation, LVM Creation
- IX. The X Window System
1. The X Protocol
  2. X Security
  3. xauth with ssh
  4. X Modularity
  5. X Extensibility
  6. Window Managers
  7. Display Managers
  8. XFree86 Startup
  9. X Server Configuration
  10. The X Font Server
  11. **Hands-on Lab:** The X Window System
- X. Troubleshooting
1. Basic Troubleshooting Guidelines
  2. Troubleshooting X
  3. Troubleshooting Services
  4. Troubleshooting Networking
  5. Troubleshooting Boot Problems
  6. Filesystem Corruption and Recovery
  7. Recovery Run-levels
  8. Boot Floppies
  9. Rescue Environment Utilities
  10. Rescue Environment Details
  11. **Hands-on Lab:** System Rescue and Troubleshooting

### **Course Requirements**

Grading: Grading procedures will be determined by the faculty member, will be provided the first week of class, and will include:

1. Minimum of 11 lab performance tests / lab projects

Lab Test. Red Hat Enterprise Linux Installation

Lab Test. Hardware and Device Configuration

Lab Test. Linux Filesystem Management

Lab Test. System Initialization and Services

Lab Test. User and Group Administration

Lab Test. Network Configuration

Lab Test. System Administration Tools

Lab Test. RPM and Red Hat Network  
Lab Test. Kernel Services and Configuration  
Lab Test. The X Windowing System  
Lab Test. Troubleshooting

2. Minimum of 11 tests.

Test. Red Hat Enterprise Linux Installation  
Test. Hardware and Device Configuration  
Test. Linux Filesystem Management  
Test. System Initialization and Services  
Test. User and Group Administration  
Test. Network Configuration  
Test. System Administration Tools  
Test. RPM and Red Hat Network  
Test. Kernel Services and Configuration  
Test. The X Windowing System  
Test. Troubleshooting

3. Comprehensive final and lab performance test

**Other Course Information**

- This course is required in DCOM: RedHat Certificate and A.A.S. Degree Option
- It is an elective in CIS: Programming, CIS: General, and CIS: Information Technology Support.
- It is also required in some Networking Technology options.
- This course is taught in a combination of lecture and computerized laboratory format.
- This course is the second course in a two-course sequence.