Virginia Western Community College
ITN 111
Server Administration (Windows Server 2016)

Prerequisites
TEL 150

Course Description
Covers installation, configuration, administration, management, maintenance, and troubleshooting of a server in a networked environment.

Semester Credits: 4   Lecture Hours: 4   Lab/Clinical/Internship Hours: 0

Required Materials

Textbook:
   Hands-On Microsoft Windows Server 2016 2nd Edition by Michael Palmer Cengage ISBN: 9781305464797
Other Required Materials:
None

Course Outcomes

At the completion of this course, the student should be able to:
- Identify the key features of each Windows Server 2016 edition
- Understand the hardware requirements for Windows Server 2016
- Identify client systems that can be used with Windows Server 2016
- Understand important general features of Windows Server 2016
- Plan a Windows Server 2016 networking model
- Explore introductory concepts for the networking protocols, IPv4 and IPv6, used by Windows Server 2016
- Configure and enable TCP/IP in Windows Server 2016
- Plan and make the appropriate preparations for installing Windows Server 2016
- Understand the different installation methods used and install Windows Server 2016
- Set up Windows Server 2016 using Server Manager
- Activate Windows Server 2016
- Install and configure Windows Deployment Services
- Install Windows Server Core
- Install service packs
- Troubleshoot installation problems

- Uninstall Windows Server 2016
- Use Server Manager to manage a server
- Install and remove server roles
- Use the Best Practices Analyzer on server roles
- Configure server hardware
- Use System File Checker and Sigverif to verify system files
- Configure the operating system, tune performance, and configure environment variables
- Understand and configure the Registry
- Use Windows PowerShell
- Understand Active Directory basic concepts
- Install and configure Active Directory
- Implement Active Directory containers
- Understand Azure Active Directory
- Create and manage user accounts
- Configure and use security groups
- Understand user profiles
- Describe important additional features in Active Directory
- Set up security for folders and files
- Configure shared folders and shared folder security
- Troubleshoot security conflicts
- Implement work folders
- Install and set up the Distributed File System
- Configure disk quotas
- Understand how Windows Server 2016 printing works on a network and on the Internet
- Understand and apply the Print and Document Services role
- Use the XPS Print Path
- Use the Print Management tool to configure network printing resources
- Install local and shared printers
- Configure printer properties
- Configure a network or Internet printer
- Manage print jobs
- Troubleshoot common printing problems
- Understand storage options for Windows Server 2016
- Use the Disk Management tool to configure and manage storage
- Explain and configure RAID disk storage fault tolerance
- Use Storage Spaces for disk storage and fault tolerance
- Understand Multipath I/O
- Back up and recover disks, folders, and files
- Install, configure, and troubleshoot DNS
- Create a DNS implementation plan
- Install, configure, and troubleshoot DHCP
- Install the IP Address Management tool
- Configure NIC teaming

- Install, configure, and troubleshoot Microsoft Internet Information Services
- Understand Windows Server 2016 remote access services
- Implement and manage a virtual private network
- Configure a VPN server
- Implement a DirectAccess server
- Troubleshoot virtual private network and DirectAccess remote access installations
- Install and configure Remote Desktop Services
- Understand Windows Server 2016 remote access services
- Implement and manage a virtual private network
- Configure a VPN server
- Implement a DirectAccess server
- Troubleshoot virtual private network and DirectAccess remote access installations
- Install and configure Remote Desktop Services
- Understand how Windows Server 2016 uses Group Policies
- Understand and configure security policies
- Implement Active Directory Rights Management Services
- Manage security using the Security Templates and Security Configuration and Analysis snap-ins
- Configure security policies for client computers
- Use the cipher command for encryption
- Use BitLocker Drive Encryption
- Configure Network Address Translation
- Configure Windows Firewall
- Use Windows Defender
- Understand the importance of server monitoring
- Use Resource Monitor
- Monitor server services and solve problems with services
- Use Task Manager for server monitoring
- Configure and use Performance Monitor
- Set up and use Data Collector Sets for performance and diagnostic information
- Implement the SNMP service for network management
- Understand general problem-solving strategies
- Resolve boot problems
- Use and configure Event Viewer
- Troubleshoot network connectivity
- Remotely administer one or more servers
- Create VMs with Hyper-V

- Plan for High Availability of Windows Servers.
- Understand user rights, configure security options and UAC
- Secure infrastructure services.
- Manage and Monitoring servers and server logs.
- Grasp Server patching, backup and restore processes.
- Manage user and group rights and permissions on Windows Server 2012

Topical Description

Chapter	Topics
Chapter 01	- Windows Server 2016 Editions - Windows Server 2016 Essentials Edition - Windows Server 2016 Standard Edition - Windows Server 2016 Datacenter Edition - Windows Server 2016 Multipoint Premium Server - Windows Storage Server 2016 - Microsoft Hyper-V Server 2016 - Hardware Requirements for Windows Server 2016 - Virtual Activity - Using Windows Server 2016 with Client Systems - Windows Server 2016 Features - Server Manager - Security - Clustering and Clustering Tools - Enhanced Web Services - Windows Server Core and Nano Server - Windows PowerShell - Virtualization - Reliability - Multitasking and Multithreading - Physical and Logical Processors - Containers - Planning a Windows Server 2016 Networking Model - Peer-to-Peer Networking - Server-Based Networking - Protocols for the Windows Server 2016 Networking Model - Transmission Control Protocol - Internet Protocol - Physical Addresses and the Address Resolution Protocol - Implementing TCP/IP in Windows Server 2016 - Enabling TCP/IP - Configuring TCP/IP - Automated Address Configuration

Chapter 02	• Preparing for Installation
	○ Identifying Hardware Requirements and Determining Compatibility
	○ Determining Disk Partitioning Options
	○ Understanding NTFS and ReFS
	○ Upgrading to Windows Server 2016
	○ Planning User and Device Licensing
	○ Determining Domain or Workgroup Membership
	○ Choosing a Computer Name
	○ Determining Whether to Install Nano Server, Server Core, or the Full GUI Version
	○ Identifying Server Roles 60 Making Immediate Preparations
	• Overview of Windows Server 2016 Installation Methods
	○ DVD or USB Thumb Drive Installation
	○ Upgrading from Windows Server 2012/R2
	○ Installation for a Virtual Server Using Hyper-V
	○ Windows Deployment Services
	• Performing a DVD-Based Installation
	• Using Server Manager for the Initial Setup
	• Server Activation
	• Using Windows Deployment Services
	○ Installing and Configuring Windows Deployment Services
	○ Elements for an Unattended Installation
	• Installing Windows Server Core
	• Installing and Managing Service Packs
	• Troubleshooting Installation Problems
	• Removing Windows Server 2016
Chapter 03	• Installing and Removing Server Roles
	• Using the Best Practices Analyzer (BPA) for Server Roles
	• Configuring Server Hardware Devices
	○ Plug and Play
	○ Using Control Panel and the Devices and Printers Utility
	• Using the System File Checker
	• Using Sigverif to Verify System and Critical Files
	• Configuring the Operating System
	○ Configuring Performance Options
	○ Configuring Environment Variables
	○ Configuring Startup and Recovery
	○ Configuring Power Options
	○ Installing a Protocol
	• Understanding the Windows Server 2016 Registry
	○ Registry Contents
	○ HKEY_LOCAL_MACHINE
	○ HKEY_CURRENT_USER
	○ HKEY_USERS

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	o HKEY_CLASSES_ROOT
	o HKEY_CURRENT_CONFIG
	o Backing Up the Registry
	• Windows PowerShell
Chapter 04	• Active Directory Basics
	o Schema
	o Global Catalog
	o Namespace
	• Containers in Active Directory
	o Forest
	o Tree
	o Domain
	o Organizational Unit
	o Site
	o Active Directory Guidelines
	• Azure Active Directory
	• User Account Management
	o Creating Accounts When Active Directory Is Not Installed
	o Creating Accounts When Active Directory Is Installed
	o Disabling, Enabling, and Renaming Accounts
	o Moving an Account
	o Resetting a Password
	o Deleting an Account
	• Security Group Management
	o Implementing Local Groups
	o Implementing Domain Local Groups
	o Implementing Global Groups
	o Implementing Universal Groups
	o Properties of Groups
	• Implementing User Profiles
	• Important Features in Windows Server 2016 Active Directory
	o Restart Capability
	o Read-Only Domain Controller
	o Cloning Domain Controllers
	o Fine-Grained Password Policy Enhancements
	o Protected Users Global Group
Chapter 05	• Managing Folder and File Security
	o Configuring Folder and File Attributes
	o Configuring Folder and File Permissions
	o Configuring Folder and File Auditing
	o Configuring Folder and File Ownership
	• Configuring Shared Folders and Shared Folder Permissions
	o Enabling Sharing

	- o Configuring Folder/File Sharing Through the Folder/File Properties - o Configuring Sharing Through Server Manager - o Publishing a Shared Folder in Active Directory - Troubleshooting a Security Conflict - Using Work Folders - Implementing a Distributed File System - o DFS Replication - o DFS Models - o DFS Topology - o Installing DFS - o Managing a Domain-Based Namespace Root System - Configuring Disk Quotas
Chapter 06	- An Overview of Windows Server 2016 Printing - o How Network Printing Works - o How Internet Printing Works - The Print and Document Services Role - Using the XPS Print Path - The Devices and Printers Utility - Using the Print Management Tool - o Configuring the Print Server Properties - Installing Local and Shared Printers - Configuring Printer Properties - o General Printer Specifications - o Sharing Printers - o Port Specifications - o Printer Scheduling and Advanced Options - o Configuring Security - o Configuring Device Settings - Configuring a Nonlocal Printer or an Internet Printer - Managing Print Jobs - o Controlling the Status of Printing - o Controlling Specific Print Jobs - Troubleshooting Common Printing Problems
Chapter 07	- Windows Server 2016 Storage Options - o Basic Disks - o Dynamic Disks - Disk Management - o Creating a Partition and Simple Volume - o Managing Disks - Introduction to Fault Tolerance - o RAID Volumes - o Using a Striped Volume (RAID-0) - o Using a Mirrored Volume (RAID-1)

	- Using a RAID-5 Volume - Software RAID vs. Hardware RAID - Storage Spaces - Storage Spaces Direct - Multipath Input/Output - Disk Backup - Windows Server Backup - Backup Options - Scheduling Backups - Configuring Backup Performance - Performing a Recovery
Chapter 08	- Implementing Microsoft DNS - Installing DNS Services - DNS Zones - Using the DNS Dynamic Update Protocol - DNS Replication - Stub Zone - Additional DNS Server Roles - Using DNS to Balance Application Access - Creating a DNS Implementation Plan - DNS Enhancements in Windows Server 2016 - Troubleshooting DNS - Implementing Microsoft DHCP - Configuring a DHCP Server - Lease Times - DHCPv6 Support - Troubleshooting DHCP - IP Address Management - Redundancy Through NIC Teaming - Implementing Microsoft Internet Information Services - Installing a Web Server - Web Server Best Practices - Internet Information Services (IIS) Manager - Creating a Virtual Directory - Managing and Configuring an IIS Web Server - Troubleshooting a Web Server
Chapter 09	- Introduction to Remote Access - Implementing a Virtual Private Network - Using Remote Access Protocols - Configuring a VPN Server - Configuring the Server's Firewall - Configuring a DHCP Relay Agent - Configuring VPN Properties

	• o Configuring VPN Security
	   o Monitoring VPN Users
	• Implementing DirectAccess
	• Troubleshooting VPN and DirectAccess Installations
	   o Hardware Solutions
	   o Software Solutions
	• Connecting Through Remote Desktop Services
	   o Installing Remote Desktop Services
	   o Configuring Remote Desktop Services
	   o Accessing an RDS Server from a Client
	   o Publishing Applications for RemoteApp on an RDS Server

Chapter 10	• An Overview of Security Features in Windows Server 2016
	• Introduction to Group Policy
	• Securing Windows Server 2016 Using Security Policies
	   o Establishing Account Policies
	   o Establishing Audit Policies
	   o Configuring User Rights
	   o Configuring Security Options
	   o Using IP Security Policies
	• Active Directory Rights Management Services
	• Managing Security Using the Security Templates and Security and Configuration Analysis Snap-Ins
	• Configuring Client Security Using Policies in Windows Server 2016
	   o Manually Configuring Policies for Clients
	   o Publishing and Assigning Software
	   o Resultant Set of Policy
	• Using the cipher Command
	• Using BitLocker Drive Encryption
	• Configuring NAT
	• Windows Firewall
	• Windows Defender

Chapter 11	• Introduction to Server Monitoring
	• Using Resource Monitor
	• Monitoring Server Services
	   o Accessing Server Services
	   o Solving a Problem with a Service
	• Using Task Manager
	   o Monitoring Applications
	   o Monitoring Processes
	   o Setting Priorities
	   o Monitoring Services
	   o Monitoring Real-Time Performance
	   o Monitoring Users

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	• Using Performance Monitor
	    ○ Capturing Data Using Performance Monitor
	    ○ Monitoring System Components
	• Using Data Collector Sets
	    ○ Using a Wizard and a Template to Create a Data Collector Set
	    ○ Returning to a Report and the Importance of Network Data
	    ○ Using a Predefined Data Collector Set
	• Implementing the SNMP Service

Chapter 12	• General Problem-Solving Strategies
	    ○ Understanding How Servers and the Network Interact
	    ○ Training Users to Help
	    ○ Solving Problems Step-by-Step
	    ○ Tracking Problems and Solutions
	• Resolving Boot Problems
	    ○ Troubleshooting by Using Safe Mode
	    ○ Troubleshooting by Using the Repair Your Computer Option or Installation DVD
	    ○ General Tips for Fixing Boot Problems
	• Using and Configuring Event Viewer
	    ○ Viewing Log Events
	    ○ Using the Event Viewer Filter Option
	    ○ Maintaining Event Logs
	• Troubleshooting Connectivity
	    ○ Graphical Tools
	    ○ Using the System Configuration Tool
	• Remotely Administering a Server
	    ○ Remote Server Administration Tools

Appendix A	• Windows Server 2016 Virtualization and Hyper-V
Appendix B	• Sample PowerShell Cmdlets

<u>Notes to Instructors</u>

- All instructors are to use the same textbook
- All course sections are to follow the same basic course outline
- Lectures must be made available for asynchronous viewing by students taking this class in a nontraditional manner.
- Labs are to be completed in class or on VWCC netlab system

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