**Course Introduction**

**Module 01 - Network Basics**

**Topic A: Network Concepts**

Networks
Local Area Networks
Basic Network Types
Peer-to-Peer Model
Peer-to-Peer Authentication
Client/Server Model
Client/Server Authentication
Segments and Backbones
Network Wiring
Fiber Optic
Twisted Pair
Composite Cable
Coaxial
Live Demo: Cable Types
Serial
Duplex
Wireless LAN
Benefits/Drawbacks of WLANs
Network Protocols
Wireless Network Protocols

**Topic B: Network Architectures**

Network Architecture
Star Architecture
Bus Architecture
Ring Architecture
Mesh Architecture
Hybrid Architecture
Point-to-Point
Point-to-Multipoint
Packet vs. Circuit Switching
Ethernet
Ethernet Mediums
Ethernet Standards
Ethernet Networks
Data Collisions
Channel Access Methods
Token Ring Networks
Wireless LANs
Wide Area Networks
WAN Connections
POTS/PSTN
ISDN
DSL
Cable
Satellite
Wireless WAN
Cellular
T and E Lines
X.25 and Frame Relay
ATM
Mesh Networks

**Topic C: The OSI Model**
- OSI Model
- OSI Layer 7
- OSI Layer 6
- OSI Layer 5
- OSI Layer 4
- OSI Layer 3
- OSI Layer 2
- OSI Layer 1

**Module 02 - Wired Computer-to-Computer Connections**

**Module 01 - Review**

**Topic A: Wired Network Connections**
- Fiber Optic Wired Connections
- SONET
- Fiber Optic Connectors
- Fiber Optic Connector Types
- Twisted Pair Connections
- UTP Categories
- Stranded vs. Solid
- Twisted Pair Connectors
- RJ Connectors
- Modern Residential Wiring
- RJ-45 Connector
- Pin Numbering of RJ-45 Connector
- Terminating CatX to RJ-45
- Live Demo: Crossover Cable
- Coaxial Connections
- RG Standards
- Thinnet Connectors
- Live Demo: Thinnet Connectors
- Thicknet Vampire Tap
- Plenum

**Topic B: Network Interface Cards and Modems**
- Network Adapter
- Live Demo: NIC Installation
- Live Demo: NIC Removal
- Internal NICs
- Notebook Computers
- NIC Selection
- Live Demo: NIC Card
- Live Demo: PCM CIA
- Addressing
- MAC Address
- IPv4
- IPv6
- Character-Based Names
- Domain Name System (DNS)
Module 03 - Network-to-Network Connections

**Topic A: Network-to-Network Connection Components**
- Network Access Points
- Internet Service Providers (ISPs)
- Small ISPs
- Regional ISP
- LAN Installation Components
- Cross-Connects
- Standards
- Typical UTP Installation
- Telecommunications Room
- Punchdown Block
- Live Demo: Punchdown Block
- Wire Placement

**Topic B: LAN Wiring**
- LAN Wiring Categories
- Guidelines
- Backbone Installation
- Workstation Runs
- Calculate Workstation Run Length
- Modular Office Systems
- Telecommunications Room Management
- Telecommunications Room Equipment
- Patch Panel
- Connecting Block
- Punchdown Tool
- Punchdown Procedure
- Live Demo: Punchdown Tool

**Topic C: LAN Wiring Tests**
- LAN Wiring Tests
- Testing Equipment
- Module 03 - Review
Module 04 - Wired Internetworking Devices

Topic A: Basic Internetworking Devices
- Common Internetworking Devices
- Repeaters
- Repeater Placement
- Repeater Operation
- Repeater Issues
- Bridges
- Bridge Operation
- Bridge Types
- Bridge Routing Management
- Bridge Filtering and Intelligence
- Local and Remote Bridges
- Layer 2 Switch
- Bridges vs. Switches
- Live Demo: Switch
- Trunking Example
- Routers
- Router Operation
- About Routers
- Router Features
- Key Points
- Types of Routers
- Routing Table Contents
- Routing Examples
- Brouters
- Bridges vs. Routers
- Ethernet Hub
- Hub Types
- Token Ring MSAU
- Token Ring Distances
- MSAU Functions
- Media Converters
- Firewalls
- Firewall Functions
- Hardware Firewall
- Software Firewall
- Proxy Server
- Port and Packet Filtering

Topic B: Specialized Internetworking Devices
- Higher-Level Switches
- Content Switches
- IDS and IPS
- IDS
- Malicious Traffic Detected by IDS
- IPS
- Traffic Shapers
- Multiprotocol Label Switching (MPLS)
- Multifunction Network Devices

Module 04 - Review
Module 05 - Wired Communication Standards

**Topic A: The TCP/IP Protocol Suite**
- Network Communication Protocols
- TCP/IP Architecture
- Network Interface Layer Protocols
- Address Resolution Protocol (ARP)
- MAC Address Filter
- Data Packet Addresses
- ARP Request Packet Structure
- ARP Reply Packet Structure
- Router Forwarding
- IPConfig
- Demo: ARP Connectivity
- Internet Layer Protocols
- Internet Protocol (IP)
- RIP/RIPv2 and OSPF
- ICMP/ICMPv6
- IGMP
- SSH
- Transport Layer Protocols
- Service Port Numbers
- Demo: Port Numbers
- TCP
- TCP Three-Way Handshake
- Microsoft Network Monitor
- UDP
- Demo: Packet Capture
- Application Layer Protocols
- HTTP
- FTP
- Telnet
- Demo: Using Telnet
- NTP
- Email Messaging Protocols

**Topic B: TCP/IP**
- IPv4
- Classful IPv4 Addresses
- Subnet Masks
- Network IDs
- Special Addresses
- CIDR
- CIDR Address
- Demo: Binary Conversion
- Demo: Subnetting Theory
- Demo: Subnetting Practical
- NAT
- APIPA
- IPv6
- IPv6 Address Types
- IPv6 Address Scopes
- Subnet Mask Communication
- IPv4 Custom Subnets
- IPv6 Subnets
- IPv6 Custom Subnets
Default Gateway
Address Translation
DNS
DNS Namespace
WINS
Static TCP/IP Configuration
DHCP and DHCPv6
IPv4 Lease Process
IPv6 Lease Process
IPv6 Router Flags
M and O Flags

**Topic C: DHCP Servers**
Installing a DHCP Server
Demo: DHCPv4
IPv6 Scopes
Demo: DHCPv6
Module 05 - Review

**Module 06 - Wireless Networking**

**Topic A: Wireless Network Devices**
Wireless
Wireless Connections
Infrared
Radio
Bluetooth
Wireless Communications
Indoor Point-to-Multipoint LANs
Live Demo: Wireless Router
Outdoor Point-to-Point Links
Outdoor Point-to-Multipoint Links
Wireless Connection Components
Wireless NICs
Live Demo: Wireless Network Adapters
Live Demo: USB Wireless
Wireless Access Points
Wireless Speeds
WAP Placement

**Topic B: Wireless Networking Standards**
Standards
802.1x Standard
802.11 Standard
Access Point
802.11 WLAN Standards
Wireless Protocols
LAN Technologies
Wi-Fi
Bluetooth
802.11a/802.11g
WiMAX
Topic C: Wireless Configuration
WLAN Security Risks
Additional Risks
WLAN Security Components
Transmission Encryption
802.1x Authentication
Wireless Access Point Configuration
Securing Your AP
Demo: WAP
Wireless Clients
Wireless Auto Configuration
Windows CE Wireless Clients
Module 06 - Review

Module 07 - Security Threats and Mitigation 1h 54m

Topic A: Security Threats
Security Threat Categories
Technology Weaknesses
Configuration Weaknesses
Human Error and Malice
Viruses, Worms, Trojan Horses
Social Engineering
Dumpster Diving
Online Attacks
Countermeasures
Phishing
Denial of Service Attacks
SYN Flood Attack
SYN Flood Defense
Smurf Attacks
Ping of Death
Distributed DoS Attacks
DDoS Countermeasures
Demo: DDoS
Man-in-the-Middle
Spoofing
IP Address Spoofing
Demo: Port Scanner

Topic B: Threat Mitigation
Security Policies
Acceptable Use
Due Care
Privacy
Separation of Duties
Need to Know
Password Management
Account Expiration
Service-Level Agreement
Disposal and Destruction
Human Resources Policy
Incident Response Policy
Preparation
Detection
Module 08 - Security Practices  

**Topic A: Operating Systems**  
Antivirus Software  
Demo: Antivirus  
Spyware  
Windows Defender  
Demo: Spyware  
Securing the Operating System  
Windows Update  
Update Categories  
Patch Management  
Demo: Windows Updates  
Other Updates  
System Information  
Windows Firewall  
Demo: BIOS  
Demo: Firewall

**Topic B: Devices**  
Firewalls and Proxy Servers  
Security Zones  
Intranet  
Perimeter Network  
DMZ  
Screened Host  
Bastion Host  
Three-Homed Firewall  
Back-to-Back Firewall  
Dead Zone  
Traffic Filtering  
Network Access Control  
Virtual Private Network  
IPSec Encryption  
Demo: IPSec  
Security Issues  
Built-In Management Interfaces  
Secure and Unsecure Methods  
Physical Attack Susceptibility  
Overcoming Device Weaknesses  
Intrusion Detection and Prevention  
NIDS  
HIDS
Module 09 - Network Access Control

Topic A: Authentication
AAA
Usernames and Passwords
Password Protection
Strong Passwords
Multiple Passwords
Authentication Factors
One-Factor Authentication
Two-Factor Authentication
Three-Factor Authentication
Live Demo: Thumb Scanner
Authentication Protocols
Preventing Impersonation
Identify Proofing
Single Sign-On
Kerberos
Kerberos System Composition
Kerberos Data Types
Kerberos Authentication Process
Kerberos Security Weaknesses
CHAP
EAP
Mutual Authentication

Topic B: Public Key Cryptography
Cryptography
ROT13 Cipher
Keys
Symmetric Encryption in Action
Public Key Cryptography
Asymmetric Encryption in Action
Public Key Cryptography Characteristics
Public Key Infrastructure
Demo: Public Key Infrastructure
Setup and Initialization Phase
Administration Phase
Cancellation and History Phase

Topic C: Remote Access
AAA
RADIUS
RADIUS Authentication
Realms
RADIUS Security
RADIUS Benefits
Diameter
Diameter Improvements
LDAP and Remote Access
LDAP Security
LDAP Authentication/Authorization
TACACS+
TACACS+ vs. RADIUS
802.1x
Virtual Private Networks
VPN Technologies
VPN Security Models
VPN Protocols
PPTP vs. L2TP
IPSec Protocols
Encryption Modes
Secure Shell (SSH)
VPN Solutions
Service Provider Tunneling

**Topic D: Wireless Security**
802.11 Standard
Wireless Security
Wireless Vulnerabilities
Wi-Fi Scanners
Warchalking Symbols
Module 09 - Review

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**Module 10 – Monitoring**

**Topic A: Monitoring Resources**
Resource Overview
Performance Monitor
Performance Objects
Demo: Performance Monitor
Bottlenecks
Configuration
Data Collector Sets
Data Collector Set Reports
Demo: Data Collector Sets
Reliability Monitor
Remote Desktop
Remote Desktop Options
Remote Desktop Connection
Demo: Remote Desktop

**Topic B: Event Viewer**
Event Viewer
Event Information
Event Types
Remote Logs
Event Forwarding
Demo: Event Forwarding
Source Computers
Collecting Computers
Subscriptions
Device and Application Logging
Module 10 - Review
Module 11 – Troubleshooting

Topic A: Troubleshooting Basics
Troubleshooting
Information Gathering
Identify the Affected Area
Determine If Anything Has Changed
Establish Probable Cause
Determine If Escalation Is Necessary
Create an Action Plan
Implement and Test a Solution
Identify Results and Effects
Document Problem and Solution
Problem and Resolution Tracking
Hardware Toolkit
Live Demo: Multimeter
Additional Tools
Software Toolkit

Topic B: Troubleshooting The Network
Troubleshooting Wired Connections
Cable Testing Devices
Physical Cable Tests
Live Demo: Troubleshooting
Network Function Tests
Network Analyzer
Troubleshooting Wireless
TCP/IP Utilities
IPConfig
Unix IFConfig
Ping
Ping Troubleshooting
NSLookup and Tracert
Windows Network Diagnostics
Demo: Troubleshooting Connections
Demo: Network Diagnostic

Topic C: Troubleshooting Scenarios
Remote Desktop Components
Module 11 - Review
Course Closure

Total Duration: 25 hrs 53 min