

# **Certified Network Defense (CND) Outline**

## **Module 01: Computer Network and Defense Fundamentals**

- Network Fundamentals
  - Computer Network
  - Types of Network
  - Major Network Topologies
- Network Components
  - Network Interface Card (NIC)
  - Repeater
  - Hub
  - Switches
  - Router
  - Bridges
  - Gateways
- TCP/IP Networking Basics
  - Standard Network Models: OSI Model
  - Standard Network Models: TCP/IP Model
  - Comparing OSI and TCP/IP
- TCP/IP Protocol Stack
  - Domain Name System (DNS)
  - DNS Packet Format
  - Transmission Control Protocol (TCP)
    - TCP Header Format
    - TCP Services
    - TCP Operation
    - Three-way handshake
  - User Datagram Protocol (UDP)
    - UDP Operation
  - IP Header
    - IP Header: Protocol Field
    - What is Internet Protocol v6 (IPv6)?
    - IPv6 Header
  - Internet Control Message Protocol (ICMP)
    - Format of an ICMP Message
  - Address Resolution Protocol (ARP)
    - ARP Packet Format

- Ethernet
- Fiber Distributed Data Interface (FDDI)
- Token Ring
- IP Addressing
  - Classful IP Addressing
  - Address Classes
  - Reserved IP Address
  - Subnet Masking
    - Subnetting
    - Supernetting
  - IPv6 Addressing
    - Difference between IPv4 and IPv6
    - IPv4 compatible IPv6 Address
- Computer Network Defense (CND)
  - Computer Fundamental Attributes
  - What CND is NOT
  - CND Layers
    - CND Layer 1: Technologies
    - CND Layer 2: Operations
    - CND Layer 3: People
  - Blue Teaming
  - Network Defense-In-Depth
  - Typical Secure Network Design
- CND Triad
- CND Process
- CND Actions
- CND Approaches

## **Module 02: Network Security Threats, Vulnerabilities, and Attacks**

- Essential Terminologies
  - Threats
  - Vulnerabilities
  - Attacks
- Network Security Concerns
  - Why Network Security Concern Arises?
  - Fundamental Network Security Threats

- Types of Network Security Threats
- Where they arise from?
- How does network security breach affect business continuity?
- Network Security Vulnerabilities
  - Types of Network Security Vulnerabilities
  - Technological Vulnerabilities
  - Configuration Vulnerabilities
  - Security policy Vulnerabilities
  - Types of Network Security Attacks
- Network Reconnaissance Attacks
  - Reconnaissance Attacks
    - Reconnaissance Attacks: ICMP Scanning
    - Reconnaissance Attacks: Ping Sweep
    - Reconnaissance Attacks: DNS Footprinting
    - Reconnaissance Attacks: Network Range Discovery
    - Reconnaissance Attacks: Network Topology Identification
    - Reconnaissance Attacks: Network Information Extraction using Nmap Scan
    - Reconnaissance Attacks: Port Scanning
    - Reconnaissance Attacks : Network Sniffing
    - How an Attacker Hacks the Network Using Sniffers
    - Reconnaissance Attacks : Social Engineering Attacks
- Network Access Attacks
  - Password Attacks
  - Password Attack Techniques
    - Dictionary Attack
    - Brute Forcing Attacks
    - Hybrid Attack
    - Birthday Attack
    - Rainbow Table Attack
  - Man-in-the-Middle Attack
  - Replay Attack
  - Smurf Attack
  - Spam and Spim
  - Xmas Attack
  - Pharming
  - Privilege Escalation

- DNS Poisoning
- DNS Cache Poisoning
- ARP Poisoning
- DHCP Attacks: DHCP Starvation Attacks
  - DHCP Attacks: DHCP Spoofing Attack
- Switch Port Stealing
- Spoofing Attacks
  - MAC Spoofing/Duplicating
- Denial of Service (DoS) Attacks
- Distributed Denial-of-Service Attack (DDoS)
- Malware Attacks
  - Malware
    - Types of Malware: Trojan
    - Types of Malware: Virus and Armored Virus
  - Malware Attacks
    - Adware
    - Spyware
    - Rootkits
    - Backdoors
    - Logic Bomb
    - Botnets
    - Ransomware
    - Polymorphic malware

### **Module 03: Network Security Controls, Protocols, and Devices**

- Fundamental Elements of Network Security
  - Network Security Controls
  - Network Security Protocols
  - Network Security Perimeter Appliances
- Network Security Controls
  - Access Control
    - Access Control Terminology
    - Access Control Principles
    - Access Control System: Administrative Access Control
    - Access Control System: Physical Access Controls
    - Access Control System: Technical Access Controls
  - Types of Access Control

- Discretionary Access Control (DAC)
  - Mandatory Access Control (MAC)
  - Role-based Access
- Network Access Control (NAC)
- NAC Solutions
- User Identification, Authentication, Authorization and Accounting
  - Types of Authentication :Password Authentication
  - Types of Authentication: Two-factor Authentication
  - Types of Authentication : Biometrics
  - Types of Authentication : Smart Card Authentication
  - Types of Authentication: Single Sign-on (SSO)
- Types of Authorization Systems
  - Centralized Authorization
  - Implicit Authorization
  - Decentralized Authorization
  - Explicit Authorization
- Authorization Principles
  - Least privilege
  - Separation of duties
- Cryptography
  - Encryption
    - Symmetric Encryption
    - Asymmetric Encryption
  - Hashing: Data Integrity
  - Digital Signatures
  - Digital Certificates
  - Public Key Infrastructure (PKI)
- Security Policy
  - Network Security Policy
  - Key Consideration for Network Security Policy
  - Types of Network Security Policies
- Network Security Devices
  - Firewalls
  - DMZ
  - Virtual Private Network (VPN)
  - Proxy Server

- Advantages Of using Proxy Servers
  - Proxy Tools
- Honeypot
  - Advantages of using Honeypots
  - Honeypot Tools
- Intrusion Detection System (IDS)
- Intrusion Prevention System (IPS)
- IDS/IPS Solutions
- Network Protocol Analyzer
  - How it Works
  - Advantages of using Network Protocol Analyzer
  - Network Protocol Analyzer Tools
- Internet Content Filter
  - Advantages of using Internet Content Filters
  - Internet Content Filters
- Integrated Network Security Hardware
- Network Security Protocols
  - Transport Layer
  - Network Layer
  - Application Layer
  - Data Link Layer
- RADIUS
- TACACS+
- Kerberos
- Pretty Good Service (PGP) Protocol
- S/MIME Protocol
  - How it Works
  - Difference between PGP and S/MIME
- Secure HTTP
- Hyper Text Transfer Protocol Secure (HTTPS)
- Transport Layer Security (TLS)
- Internet Protocol Security (IPsec)

#### **Module 04: Network Security Policy Design and Implementation**

- What is Security Policy?
  - Hierarchy of Security Policy
  - Characteristics of a Good Security Policy

- Contents of Security Policy
- Typical Policy Content
- Policy Statements
- Steps to Create and Implement Security Policies
- Considerations Before Designing a Security Policy
- Design of Security Policy
- Policy Implementation Checklist
- Types of Information Security Policy
  - Enterprise information security policy(EISP)
  - Issue specific security policy(ISSP)
  - System specific security policy (SSSP)
- Internet Access Policies
  - Promiscuous Policy
  - Permissive Policy
  - Paranoid Policy
  - Prudent Policy
- Acceptable-Use Policy
- User-Account Policy
- Remote-Access Policy
- Information-Protection Policy
- Firewall-Management Policy
- Special-Access Policy
- Network-Connection Policy
- Business-Partner Policy
- Email Security Policy
- Passwords Policy
- Physical Security Policy
- Information System Security Policy
- Bring Your Own Devices (BYOD) Policy
- Software/Application Security Policy
- Data Backup Policy
- Confidential Data Policy
- Data Classification Policy
- Internet Usage Policies
- Server Policy
- Wireless Network Policy
- Incidence Response Plan (IRP)
- User Access Control Policy

- Switch Security Policy
- Intrusion Detection and Prevention (IDS/IPS) Policy
- Personal Device Usage Policy
- Encryption Policy
- Router Policy
- Security Policy Training and Awareness
- ISO Information Security Standards
  - ISO/IEC 27001:2013: Information technology — Security Techniques — Information security Management Systems — Requirements
  - ISO/IEC 27033:Information technology -- Security techniques -- Network security
- Payment Card Industry Data Security Standard (PCI-DSS)
- Health Insurance Portability and Accountability Act (HIPAA)
- Information Security Acts: Sarbanes Oxley Act (SOX)
- Information Security Acts: Gramm-Leach-Bliley Act (GLBA)
- Information Security Acts: The Digital Millennium Copyright Act (DMCA) and Federal Information Security Management Act (FISMA)
- Other Information Security Acts and Laws
  - Cyber Law in Different Countries

#### **Module 05: Physical Security**

- Physical Security
  - Need for Physical Security
  - Factors Affecting Physical Security
  - Physical Security Controls
    - Administrative Controls
    - Physical Controls
    - Technical Controls
  - Physical Security Controls: Location and Architecture Considerations
  - Physical Security Controls: Fire Fighting Systems
  - Physical Security Controls: Physical Barriers
  - Physical Security Controls: Security Personnel
- Access Control Authentication Techniques
  - Authentication Techniques: Knowledge Factors
  - Authentication Techniques: Ownership Factors
  - Authentication Techniques: Biometric Factors
- Physical Security Controls
  - Physical Locks

- Mechanical locks:
- Digital locks:
- Combination locks:
- Electronic /Electric /Electromagnetic locks:
- Concealed Weapon/Contraband Detection Devices
- Mantrap
- Security Labels and Warning Signs
- Alarm System
- Video Surveillance
- Physical Security Policies and Procedures
- Other Physical Security Measures
  - Lighting System
  - Power Supply
- Workplace Security
  - Reception Area
  - Server/ Backup Device Security
  - Critical Assets and Removable Devices
  - Securing Network Cables
  - Securing Portable Mobile Devices
- Personnel Security: Managing Staff Hiring and Leaving Process
- Laptop Security Tool: EXO5
  - Laptop Tracking Tools
- Environmental Controls
  - Heating, Ventilation and Air Conditioning
  - Electromagnetic Interference (EMI) Shielding
  - Hot and Cold Aisles
- Physical Security: Awareness /Training
- Physical Security Checklists

### **Module 06: Host Security**

- Host Security
  - Common Threats Specific to Host Security
  - Where do they come from?
  - Why Host Security?
  - Before Configuring Host Security: Identify purpose of each Host
  - Host Security Baselineing
- OS Security
  - Operating System Security Baselineing

- Common OS Security Configurations
- Windows Security
  - Windows Security Baseline: Example
  - Microsoft Baseline Security Analyzer (MBSA)
  - Setting up BIOS Password
  - Auditing Windows Registry
  - User and Password Management
  - Disabling Unnecessary User Accounts
  - Configuring user authentication
- Patch Management
  - Configuring an update method for Installing Patches
  - Patch Management Tools
- Disabling Unused System Services
- Set Appropriate Local Security Policy Settings
- Configuring Windows Firewall
- Protecting from Viruses
  - Antivirus Software
- Protecting from Spywares
  - Antispywares
- Email Security: AntiSpammers
  - Spam Filtering Software
- Enabling Pop-up Blockers
- Windows Logs Review and Audit
  - Log Review Recommendations
  - Event IDs in Windows Event log
- Configuring Host-based IDS/IPS
  - Host based IDS: OSSEC
  - AlienVault Unified Security Management (USM)
  - Tripwire
  - Additional Host Based IDSes
- File System Security: Setting Access Controls and Permission to Files and Folders
  - Creating and Securing a Windows file share
- File and File System Encryption
  - EFS Limitations
  - Data encryption Recommendations
  - DATA Encryption Tools
- Linux Security
  - Linux Baseline Security Checker: buck-security

- Password Management
- Disabling Unnecessary Services
- Killing unnecessary processes
- Linux Patch Management
- Understanding and checking Linux File Permissions
  - Changing File Permissions
  - Common File Permission Settings
  - Check and Verify Permissions for Sensitive Files and Directories
- Host-based Firewall Protection with iptables
- Linux Log review and Audit
  - Common Linux log files
  - System Log Viewer
  - Log Events to Look for
- Securing Network Servers
  - Before Hardening Servers
  - Hardening Web Server
  - Hardening Email Server: Recommendations
  - Hardening FTP Servers: Recommendations
- Hardening Routers and Switches
  - Hardening Routers: Recommendations
  - Hardening Switches
    - Hardening Switches-Recommendations
  - Logs Review and Audit: Syslog
  - GFI EventsManager: Syslog Server
- Application/software Security
  - Application Security
    - Application Security Phases
    - Application Security: Recommendations
- Data Security
  - What is Data Loss Prevention (DLP)
    - Best Practices to Prevent Data Loss
    - List of DLP Solution Vendors
    - Data Leak/Loss Prevention Tools
- Virtualization Security
  - Virtualization Terminologies
  - Introduction to Virtualization
  - Characteristics of Virtualization

- Benefits of Virtualization
- Virtualization Vendors
- Virtualization Security
  - Virtualization Security Concern
- Securing Hypervisor
- Securing Virtual machines
  - Implementing Software Firewall
  - Deploying Anti-virus Software
  - Encrypting the Virtual Machines
- Secure Virtual Network Management
  - Methods to Secure Virtual Environment
  - Virtualization Security Best Practices for Network Defenders
  - Best Practices for Virtual Environment Security

### **Module 07: Secure Firewall Configuration and Management**

- Firewalls and Concerns
- What Firewalls Does?
- What should you not Ignore?: Firewall Limitations
- How Does a Firewall Work?
- Firewall Rules
- Types of Firewalls
  - Hardware Firewall
  - Software Firewall
- Firewall Technologies
  - Packet Filtering Firewall
  - Circuit Level Gateway
  - Application Level Firewall
  - Stateful Multilayer Inspection Firewall
    - Multilayer Inspection Firewall
  - Application Proxy
  - Network Address Translation
  - Virtual Private Network
- Firewall Topologies
  - Bastion host
  - Screened subnet
  - Multi-homed firewall
  - Choosing Right Firewall Topology

- Firewall Rule Set & Policies
  - Build an Appropriate Firewall Ruleset
  - Blacklist vs Whitelist
  - Example: Packet Filter Firewall Ruleset
  - Implement Firewall Policy
  - Periodic Review of Firewall Policies
- Firewall Implementation
  - Before Firewall Implementation and Deployment
  - Firewall Implementation and Deployment
  - Planning Firewall Implementation
  - Factors to Consider before Purchasing any Firewall Solution
  - Configuring Firewall Implementation
  - Testing Firewall Implementation
  - Deploying Firewall Implementation
  - Managing and Maintaining Firewall Implementation
- Firewall Administration
  - Firewall Administration: Deny Unauthorized Public Network Access
  - Firewall Administration: Deny Unauthorized Access Inside the Network
  - Firewall Administration: Restricting Client's Access to External Host
- Firewall Logging and Auditing
  - Firewall Logging
  - Firewall Logs
- Firewall Anti-evasion Techniques
- Why Firewalls are Bypassed?
- Full Data Traffic Normalization
- Data Stream-based Inspection
- Vulnerability-based Detection and Blocking
- Firewall Security Recommendations and Best Practices
  - Secure Firewall Implementation: Best Practices
  - Secure Firewall Implementation: Recommendations
  - Secure Firewall Implementation: Do's and Don'ts
- Firewall Security Auditing Tools
  - Firewall Analyzer
  - Firewall Tester: Firewalk
  - FTTester
  - Wingate
  - Symantec Enterprise Firewall

- Hardware Based Firewalls
- Software Based Firewalls

## **Module 08: Secure IDS Configuration and Management**

- Intrusions and IDPS
  - Intrusions
    - General Indications of Intrusions
  - Intrusion Detection and Prevention Systems (IDPS)
    - Why do We Need IDPS?
- IDS
  - Role of IDS in Network Defense
  - IDS Functions
  - What Events do IDS Examine?
  - What IDS is NOT?
  - IDS Activities
  - How IDS Works?
  - IDS Components
    - Network Sensors
    - Alert Systems
    - Command Console
    - Response System
    - Attack Signature Database
  - Intrusion Detection Steps
- Types of IDS Implementation
  - Approach-based IDS
    - Anomaly and Misuse Detection Systems
  - Behavior-based IDS
  - Protection-based IDS
  - Structure-based IDS
  - Analysis Timing based IDS
  - Source Data Analysis based IDS
- IDS Deployment Strategies
  - Staged IDS Deployment
  - Deploying Network-based IDS
- Types of IDS Alerts
  - True Positive (Attack - Alert)
  - False Positive (No Attack - Alert)

- False Negative(Attack - No Alert)
- True Negative (No Attack - No Alert)
- Dealing with False Positive/Alarm
  - What should be the Acceptable Levels of False Alarms
- Calculating False Positive/False Negative Rate
- Dealing with False Negative
- Excluding False Positive Alerts with Cisco Secure IPS
- Characteristics of a Good IDS
- IDS mistakes that should be avoided
- IPS
  - IPS Technologies
  - IPS Placement
  - IPS Functions
  - Need of IPS
  - IDS vs IPS
  - Types of IPS
    - Network-Based IPS
    - Host-Based IPS
    - Wireless IPS
    - Network Behavior Analysis (NBA) System
  - Network-Based IPS
    - Network-Based IPS: Security Capabilities
    - Placement of IPS Sensors
  - Host-Based IPS
    - Host-Based IPS Architecture
  - Wireless IPS
    - WLAN Components and Architecture
    - Wireless IPS: Network Architecture
    - Security Capabilities
    - Management
  - Network Behavior Analysis (NBA) System
    - NBA Components and Sensor Locations
    - NBA Security Capabilities
- IDPS Product Selection Considerations
  - General Requirements
  - Security Capability Requirements
  - Performance Requirements

- Management Requirements
- Life Cycle Costs
- IDS Counterparts
  - Complementing IDS
  - Vulnerability Analysis or Assessment Systems
    - Advantages & Disadvantages of Vulnerability Analysis
  - File Integrity Checkers
    - File Integrity Checkers Tools
  - Honey Pot & Padded Cell Systems
    - Honey Pot and Padded Cell System Tools
  - IDS Evaluation: Snort
  - IDS/IPS Solutions
  - IDS Products and Vendors

### **Module 09: Secure VPN Configuration and Management**

- Understanding Virtual Private Network (VPN)
- How VPN works?
- Why to Establish VPN ?
- VPN Components
  - VPN Client
  - Tunnel Terminating Device
  - Network Access Server (NAS)
  - VPN Protocol
- VPN Concentrators
  - Functions of VPN Concentrator
- Types of VPN
  - Client-to-site (Remote-access) VPNs
  - Site-to-Site VPNs
  - Establishing Connections with VPN
- VPN Categories
  - Hardware VPNs
    - Hardware VPN Products
  - Software VPNs
    - Software VPN Products
- Selecting Appropriate VPN
- VPN Core Functions
  - Encapsulation

- Encryption
- Authentication
- VPN Technologies
- VPN Topologies
  - Hub-and-Spoke VPN Topology
  - Point-to-Point VPN Topology
  - Full Mesh VPN Topology
  - Star Topology
- Common VPN Flaws
  - VPN Fingerprinting
  - Insecure Storage of Authentication Credentials by VPN Clients
  - Username Enumeration Vulnerabilities
  - Offline Password Cracking
  - Man-in-the-Middle Attacks
  - Lack of Account Lockout
  - Poor Default Configurations
  - Poor Guidance and Documentation
- VPN Security
  - Firewalls
  - VPN Encryption and Security Protocols
    - Symmetric Encryption
    - Asymmetric Encryption
  - Authentication for VPN Access
    - VPN Security: IPsec Server
    - AAA Server
  - Connection to VPN: SSH and PPP
  - Connection to VPN: Concentrator
  - VPN Security – Radius
- Quality Of Service and Performance in VPNs
  - Improving VPN Speed
  - Quality of Service (QoS) in VPNs
  - SSL VPN Deployment Considerations
    - Client security
    - Client integrity scanning
    - Sandbox
    - Secure logoff and credential wiping
    - Timeouts and re-authentication

- Virus, malicious code and worm activity
- Audit and Activity awareness
- Internal Network Security Failings
- SLAs for VPN
- IP VPN Service Level Management
- VPN Service Providers
- Auditing and Testing the VPN
  - Testing VPN File Transfer
- Best Security Practices for VPN Configuration
  - Recommendations for VPN Connection

### **Module 10: Wireless Network Defense**

- Wireless Terminologies
- Wireless Networks
  - Advantages of Wireless Networks
  - Disadvantages of Wireless Networks
- Wireless Standard
- Wireless Topologies
  - Ad-hoc Standalone Network Architecture (IBSS - Independent Basic Service Set)
  - Infrastructure Network Topology (Centrally Coordinated Architecture/ BSS - Basic Service Set)
- Typical Use of Wireless Networks
  - Extension to a Wired Network
  - Multiple Access Points
  - LAN-to-LAN Wireless Network
  - 3G Hotspot
- Components of Wireless Network
  - Access Point
  - Wireless Cards (NIC)
  - Wireless Modem
  - Wireless Bridge
  - Wireless Repeater
  - Wireless Router
  - Wireless Gateways
  - Wireless USB Adapter
  - Antenna
    - Directional Antenna

- Parabolic Grid Antenna
  - Dipole Antenna
  - Omnidirectional Antenna
  - Yagi Antenna
  - Reflector Antennas
- WEP (Wired Equivalent Privacy) Encryption
- WPA (Wi-Fi Protected Access) Encryption
- WPA2 Encryption
- WEP vs. WPA vs. WPA2
- Wi-Fi Authentication Method
  - Open System Authentication
  - Shared Key Authentication
- Wi-Fi Authentication Process Using a Centralized Authentication Server
- Wireless Network Threats
  - War Driving
  - Client Mis-association
  - Unauthorized Association
  - HoneySpot Access Point (Evil Twin) Attack
  - Rogue Access Point Attack
  - Misconfigured Access Point Attack
  - Ad Hoc Connection Attack
  - AP MAC Spoofing
  - Denial-of-Service Attack
  - WPA-PSK Cracking
  - RADIUS Replay
  - ARP Poisoning Attack
  - WEP Cracking
  - Man-in-the-Middle Attack
  - Fragmentation Attack
  - Jamming Signal Attack
- Bluetooth Threats
  - Leaking Calendars and Address Books
  - Bugging Devices
  - Sending SMS Messages
  - Causing Financial Losses
  - Remote Control
  - Social Engineering

- Malicious Code
- Protocol Vulnerabilities
- Wireless Network Security
  - Creating Inventory of Wireless Devices
  - Placement of Wireless AP
    - Placement of Wireless Antenna
  - Disable SSID Broadcasting
  - Selecting Stronger Wireless Encryption Mode
  - Implementing MAC Address Filtering
  - Monitoring Wireless Network Traffic
  - Defending Against WPA Cracking
    - Passphrases
    - Client Settings
    - Passphrase Complexity
    - Additional Controls
  - Detecting Rogue Access Points
    - Wireless Scanning:
    - Wired-side Network Scanning
    - SNMP Polling
- Wi-Fi Discovery Tools
  - inSSIDer and NetSurveyor
  - Vistumbler and NetStumbler
- Locating Rogue Access points
- Protecting from Denial-of-Service Attacks: Interference
- Assessing Wireless Network Security
- Wi-Fi Security Auditing Tool: AirMagnet WiFi Analyzer
- WPA Security Assessment Tool
  - Elcomsoft Wireless Security Auditor
  - Cain & Abel
- Wi-Fi Vulnerability Scanning Tools
- Deploying Wireless IDS (WIDS) and Wireless IPS (WIPS)
  - Typical Wireless IDS/IPS Deployment
- WIPS Tool
  - Adaptive Wireless IPS
  - AirDefense
- Configuring Security on Wireless Routers
- Additional Wireless Network Security Guidelines

## **Module 11: Network Traffic Monitoring and Analysis**

- Network Traffic Monitoring and Analysis(Introduction)
  - Advantages of Network Traffic Monitoring and Analysis
  - Network Monitoring and Analysis: Techniques
    - Router Based
    - Non-Router based
  - Router Based Monitoring Techniques
    - SNMP Monitoring
    - Netflow Monitoring
  - Non-Router Based Monitoring Techniques
    - Packet Sniffers
    - Network Monitors
- Network Monitoring: Positioning your Machine at Appropriate Location
  - Connecting Your Machine to Managed Switch
- Network Traffic Signatures
  - Normal Traffic Signature
  - Attack Signatures
  - Baselining Normal Traffic Signatures
  - Categories of Suspicious Traffic Signatures
    - Informational
    - Reconnaissance
    - Unauthorized access
    - Denial of service
  - Attack Signature Analysis Techniques
    - Content-based Signatures Analysis
    - Context-based Signatures Analysis
    - Atomic Signatures-based Analysis
    - Composite Signatures-based Analysis
- Packet Sniffer: Wireshark
  - Understanding Wireshark Components
  - Wireshark Capture and Display Filters
  - Monitoring and Analyzing FTP Traffic
  - Monitoring and Analyzing TELNET Traffic
  - Monitoring and Analyzing HTTP Traffic
- Detecting OS Fingerprinting Attempts
  - Detecting Passive OS Fingerprinting Attempts

- Detecting Active OS Fingerprinting Attempts
  - Detecting ICMP Based OS Fingerprinting
  - Detecting TCP Based OS Fingerprinting
- Examine Nmap Process for OS Fingerprinting
- Detecting PING Sweep Attempt
- Detecting ARP Sweep/ ARP Scan Attempt
- Detecting TCP Scan Attempt
  - TCP Half Open/ Stealth Scan Attempt
  - TCP Full Connect Scan
  - TCP Null Scan Attempt
  - TCP Xmas Scan Attempt
- Detecting SYN/FIN DDOS Attempt
- Detecting UDP Scan Attempt
- Detecting Password Cracking Attempts
- Detecting FTP Password Cracking Attempts
- Detecting Sniffing (MITM) Attempts
- Detecting the Mac Flooding Attempt
- Detecting the ARP Poisoning Attempt
- Additional Packet Sniffing Tools
- Network Monitoring and Analysis
  - PRTG Network Monitor
- Bandwidth Monitoring
  - Bandwidth Monitoring - Best Practices
  - Bandwidth Monitoring Tools

## **Module 12: Network Risk and Vulnerability Management**

- What is Risk?
- Risk Levels
  - Extreme/High
  - Medium
  - Low
- Risk Matrix
  - Risk Management Benefits
  - Key Roles and Responsibilities in Risk management

- Key Risk Indicators(KRI)
- Risk Management Phase
  - Risk Identification
    - Establishing Context
    - Quantifying Risks
  - Risk Assessment
    - Risk Analysis
    - Risk Prioritization
  - Risk Treatment
  - Risk Treatment Steps
  - Risk Tracking & Review
- Enterprise Network Risk Management
  - Enterprise Risk Management Framework (ERM)
  - Goals of ERM Framework
  - NIST Risk Management Framework
  - COSO ERM Framework
  - COBIT Framework
  - Risk Management Information Systems (RMIS)
  - Tools for RMIS
  - Enterprise Network Risk Management Policy
  - Best Practices for Effective Implementation of Risk Management
- Vulnerability Management
  - Discovery
  - Asset Prioritization
  - Assessment
    - Advantages of Vulnerability Assessment
    - Requirements for Effective Network Vulnerability Assessment
    - Types of Vulnerability Assessment
    - Steps for Effective External Vulnerability Assessment
    - Vulnerability Assessment Phases
    - Network Vulnerability Assessment Tools
    - Choosing a Vulnerability Assessment Tool
    - Choosing a Vulnerability Assessment Tool: Deployment Practices and Precautions
  - Reporting
    - Sample Vulnerability Management Reports
  - Remediation

- Remediation Steps
- Remediation Plan
- Verification

### **Module 13: Data Backup and Recovery**

- Introduction to Data Backup
  - Backup Strategy/Plan
  - Identifying Critical Business Data
  - Selecting Backup Media
- RAID (Redundant Array Of Independent Disks) Technology
  - Advantages/Disadvantages of RAID systems
  - RAID Storage Architecture
  - RAID Level 0: Disk Striping
  - RAID Level 1: Disk Mirroring
  - RAID Level 3: Disk Striping with Parity
  - RAID Level 5: Block Interleaved Distributed Parity
  - RAID Level 10: Blocks Striped and Mirrored
  - RAID Level 50: Mirroring and Striping across Multiple RAID Levels
  - Selecting Appropriate RAID Levels
  - Hardware and Software RAIDs
  - RAID Usage Best Practices
- Storage Area Network (SAN)
  - Advantages of SAN
  - SAN Backup Best Practices
  - SAN Data Storage and Backup Management Tools
- Network Attached Storage (NAS)
  - Types of NAS Implementation
    - Integrated NAS System
    - Gateway NAS System
- Selecting Appropriate Backup Method
  - Hot Backup(Online)
  - Cold Backup(Offline)
  - Warm Backup (Nearline)
- Choosing the Right Location for Backup
  - Onsite Data Backup
  - Offsite Data Backup
  - Cloud Data Backup

- Backup Types
  - Full/Normal Data Backup
  - Differential Data Backup
  - Incremental Data Backup
  - Backup Types Advantages and Disadvantages
  - Choosing Right Backup Solution
  - Data Backup Software : AOMEI Backupper
    - Data Backup Tools for Windows
    - Data Backup Tools for MAC OS X
- Conducting Recovery Drill Test
- Data Recovery
- Windows Data Recovery Tool
  - Recover My Files
  - EASEUS Data Recovery Wizard
  - PC INSPECTOR File Recovery
  - Data Recovery Tools for MAC OS X
- RAID Data Recovery Services
- SAN Data Recovery Software
- NAS Data Recovery Services

#### **Module 14: Network Incident Response and Management**

- Incident Handling and Response
- Incident Response Team Members: Roles and Responsibilities
- First Responder
  - Network Administrators as First Responder
  - What Should You Know?
  - First Response Steps by Network Administrators
    - Avoid Fear, Uncertainty and Doubt (FUD)
    - Make an Initial Incident Assessment
    - Determining Severity Levels
    - Communicate the Incident
    - Contain the Damage : Avoid Further Harm
    - Control Access to Suspected Devices
    - Collect and Prepare Information about Suspected Device
    - Record Your Actions
    - Restrict Yourself from Doing Investigation
    - Do Not Change the State of Suspected Device

- Disable Virus Protection
- Incident Handling and Response Process
- Overview of IH&R Process Flow
  - Preparation for Incident Handling and Response
  - Detection and Analysis
  - Classification and Prioritization
  - Incident Prioritization
  - Notification and Planning
  - Containment
    - Guidelines for Incident Containment
  - Forensic Investigation
    - Network Forensics Investigation
    - People Involved in Forensics Investigation
    - Typical Forensics Investigation Methodology
  - Eradication and Recovery
    - Countermeasures
    - Systems Recovery
  - Post-incident Activities
    - Incident Documentation
    - Incident Damage and Cost Assessment
    - Review and Update the Response Policies
  - Training and Awareness