INFOSECTRAIN

New Version

CEH v13 AI

(Certified Ethical Hacker)

Certification Training

EC-Council Accredited Training Center

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Course Highlights

- **40-Hour** Instructor-led Training
- **EC-Council** Authorized Partner
- Practical Training on Latest Tools
- Highly Interactive and Dynamic Sessions
- Hands-on Labs
- **98%** Exam Pass Rate
- Access to Recorded Sessions
- Extended Post Training Support
- Career Guidance and Mentorship

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Tools Covered

1. Footprinting Tools

- Maltego
- Foca
- Recon-ng
- Google Dorks
- Whois
- theHarvester
- Shodan
- Dnsrecon
- Grecon
- Photon
- Sherlock
- Spiderfoot
- holehe

2. Scanning Tools

- Nmap
- Rustscan
- sx-Tool
- Colasoft Packet Builder
- Nessus
- OpenVAS
- QualysGuard
- Nikto
- Angry IP Scanner
- Hping3

3. Enumeration Tools

- Netcat
- SNMPCheck
- SNMPEnum
- Enum4Linux
- NbtScan
- SuperEnum
- RPCScan
- Dnsrecon

4. Vulnerability Assessment Tools

- Nessus
- OpenVAS
- QualysGuard
- Nikto
- Burp Suite
- W3af

5. System Hacking Tools

- Metasploit Framework
- Msfvenom
- Cain & Cabel
- John the Ripper
- Hydra
- Medussa

- Hashcat
- RainbowCrack
- Havoc
- PowerSploit
- Reverse-shell-generator
- L0pthCrack
- Winrtgen
- pwdump7
- Tanium Endpoint Management

6. Sniffing Tools

- Wireshark
- Tcpdump
- Ettercap
- Dsniff
- MITM
- Cain & Abel
- Macchanger

7. Social Engineering Tools

- Social-Engineer Toolkit (SET)
- Dark-Phish
- Shellphish

8. Denial of Service Tools

- Slowloris
- LOIC
- HOIC
- UltraDDoS
- PyDDoS
- PyFlooder

9. Session Hijacking Tools

- CAIDO
- Hetty
- OWASP ZAP

10. Evading IDS, Firewall, and honeypots Tools

- Nmap
- Tcpreplay
- Snort
- Hping3
- Pfsense

11. Hacking Web Server Tools

- Ghost_eye
- Impacket
- Ncat
- NMAP
- Httprecon
- ID Serve

12. Web Application Hacking Tools

- OWASP ZAP
- Burp Suite
- SQLmap
- Wapiti
- Nikto
- DirBuster
- Wpscan
- Skipfish
- PwnXSS
- Dirsearch
- ClickjackPOC

13. SQL Injection Tools

- DSSS
- ghauri
- SQLmap

14. Hacking Wireless Networks Tools

- Sparrow-wifi
- Airodump-ng
- Aircrack-ng

15. Hacking Mobile Platforms Tools

- AndroRAT
- PhoneSploit-Pro
- LOIC

16. IoT and OT Tools

- Bevywise IoT Simulator

17. AI Tools

- ShellGPT
- Tranis AI
- Malware.AI
- ChatGPT
- DeepfakeVFX
- SmartScanner
- OSS Insight
- DeepExploit
- Hoodem

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About Course

The Certified Ethical Hacker (CEH v13) training program is designed to equip professionals with the essential skills to become proficient in ethical hacking and cybersecurity. The v13 version introduces a robust integration of AI-powered technologies and advanced techniques to enhance the learning experience and effectiveness of ethical hacking strategies.

Through hands-on labs, real-world simulations, and cutting-edge AI-driven tools, participants will become proficient in ethical hacking techniques and critical cybersecurity practices for defending against traditional and modern AI-powered threats.

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Differences Between CEH v12 and CEH v13

	CEH v12	CEH v13
Total Number of Modules	20	20
Total Number of Slides	1676	1266
Total Number of Labs	220	91 Core Labs + 130 Self-study Labs*
Attack Techniques	519	550
New Technology Added	MITRE ATT&CK Framework, Diamond Model of Intrusion Analysis, Techniques for Establishing Persistence, Evading NAC and Endpoint Security, Fog Computing, Edge Computing, and Grid Computing	AI-Driven Ethical Hacking, Active Directory Attacks, Ransomware Attacks and Mitigation, AI and Machine Learning in Cybersecurity, IoT Security Challenges, Critical Infrastructure Vulnerabilities, Deepfake Threats

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Course Objectives

- Ethical hacking fundamentals, cyber kill chain concepts, an overview of information security and security measures with AI-enhanced threat detection and response.
- Concepts, methodologies, and tools of footprinting using AI for automated information gathering and reconnaissance.
- Concepts of vulnerability assessment, its categories and strategies, and AI-driven exposure to technologies used in the industry.
- Social engineering concepts and terminologies, including identity theft, impersonation, insider threats, social engineering techniques, and AI-based countermeasures.
- Operational Technology (OT) essentials, threats, attack methodologies, and AI-powered attack prevention.
- Recognizing vulnerabilities in IoT and ensuring the safety of IoT devices using AI-based security solutions.
- Encryption algorithms, Public Key Infrastructure (PKI), cryptographic attacks, cryptanalysis, and enhanced cryptographic defense.
- Cloud computing, threats and security, AI-driven container technology, and serverless computing security measures.

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Target Audience

- Security Analysts
- Ethical Hackers
- System Administrators
- Network Administrators
- Network and Security Engineers
- Cyber Security Managers
- Information Security Auditors
- Security Professionals

Pre-Requisites

- Basic understanding of network essentials and core concepts, including server and network components.

Exam Information

Certification Name	C|EH v13 (MCQ Exam)	C|EH v13 (Practical Exam)
Exam Format	Multiple Choice Questions	iLabs Cyber Range
Number of Questions	125 Questions	20 Questions
Exam Duration	240 Minutes	360 Minutes
Passing Score	60-80%	70%
Exam Delivery	VUE / ECCEXAM	-

Course Content

Module 1 Introduction to Ethical Hacking

Information Security Overview

- Elements of Information Security
- Information Security Attacks
  - → Motives (Goals)
  - → Tactics, Techniques, and Procedures (TTPs)
  - → Vulnerability
- Classification of Attacks
- Information Warfare

Hacking Concepts

- What is Hacking?
- Who is a Hacker and their Motivations?

Ethical Hacking Concepts

- What is Ethical Hacking?
- Why is Ethical Hacking necessary?
- Scope and limitations of Ethical Hacking
- Skills of an Ethical Hacker
- AI-Driven Ethical Hacking
- How AI-Driven Ethical Hacking helps Ethical Hackers?
- Myth: AI will replace Ethical Hackers
- ChatGPT-Powered AI Tool

Hacking Methodologies and Frameworks

- CEH Ethical Hacking Framework
- Cyber Kill Chain Methodology
- Adversary Behavioral Identification
- Indicators of Compromise (IoCs)
- MITRE ATT&CK Framework
- Diamond Model of Intrusion Analysis

Information Security Controls

- Information Assurance (IA)
- Continual/Adaptive Security Strategy
- Defense-in-Depth
- What is Risk?
- Risk Management
- Cyber Threat Intelligence
- Threat Intelligence Lifecycle
- Threat Modeling
- Incident Management
- Incident Handling and Response
- Role of AI and ML in Cyber Security

Information Security Laws and Standards

- Payment Card Industry Data Security Standard (PCI DSS)
- ISO/IEC Standards
- Health Insurance Portability and Accountability Act (HIPAA)
- Sarbanes Oxley Act (SOX)
- The Digital Millennium Copyright Act (DMCA)
- The Federal Information Security Management Act (FISMA)
- General Data Protection Regulation (GDPR)
- Data Protection Act 2018 (DPA)
- Cyber Law in different Countries

Module 2 Footprinting and Reconnaissance

Footprinting Concepts

- Reconnaissance
  - → Types of Footprinting/Reconnaissances
- Information obtained in Footprinting
- Objectives of Footprinting
- Footprinting Threats
- Footprinting Methodology

Footprinting through Search Engines

- Footprinting using Advanced Google Hacking Techniques
  - → What can a Hacker do with Google Hacking?
  - → Footprinting using Advanced Google Hacking Techniques with AI
  - → Google Hacking Database
- VPN Footprinting through Google Hacking Database with AI
  - → VPN Footprinting through Google Hacking Database with AI
- Footprinting through SHODAN Search Engine
- Other Techniques for Footprinting through Search Engines

- **Footprinting through Internet Research Services**
  - ✓ Finding a Company's Top-Level Domains (TLDs) and Sub-domains with AI
  - ✓ Extracting website information from https://archive.org
  - ✓ Footprinting through People Search Services
  - ✓ Footprinting through Job Sites
  - ✓ Dark Web Footprinting
    - → Searching the Dark Web with Advanced Search Parameters
  - ✓ Determining the Operating System
  - ✓ Competitive Intelligence Gathering
    - → When did this company begin?
    - → How did it develop?
    - → What are the company's plans?
    - → What expert opinions say about the company?
  - ✓ Other Techniques for Footprinting through Internet Research Services
- **Footprinting through Social Networking Sites**
  - ✓ People Search on Social Networking Sites
  - ✓ Gathering information from LinkedIn
  - ✓ Harvesting Email lists with AI
  - ✓ Analyzing Target Social Media Presence
    - → Tools for Footprinting through Social Networking Sites
    - → Footprinting through Social Networking Sites with AI

- **Whois Footprinting**
  - Whois Lookup
  - Finding IP Geolocation Information
- **DNS Footprinting**
  - Extracting DNS Information
  - DNS Lookup with AI
  - Reverse DNS Lookup
- **Network and Email Footprinting**
  - Locate the Network Range
  - Traceroute with AI
    - → Traceroute Analysis
    - → Traceroute Tools
  - Tracking Email Communications
    - → Collecting information from Email Header
    - → Email Tracking Tools
- **Footprinting through Social Engineering**
  - Collecting information through Social Engineering on Social Networking Sites
  - Collecting information using Eavesdropping, Shoulder Surfing, Dumpster Diving, and Impersonation
- **Footprinting Tasks using Advanced Tools and AI**
  - AI-Powered OSINT Tools
  - Create and run custom Python Script to automate Footprinting Tasks with AI
- **Footprinting Countermeasures**

Module 3 Scanning Networks

- **Network Scanning Concepts**
  - Overview of Network Scanning
  - TCP Communication Flags
  - TCP/IP Communication
- **Scanning Tools**
- **Host Discovery**
  - Host Discovery Techniques
    - ARP Ping Scan
    - UDP Ping Scan
    - ICMP ECHO Ping Scan
    - ICMP ECHO Ping Sweep
    - ICMP Timestamp Ping Scan
    - ICMP Address Mask Ping Scan
    - TCP SYN Ping Scan
    - TCP ACK Ping Scan
    - IP Protocol Ping Scan
    - Host Discovery with AI
    - Ping Sweep Tools

Port and Service Discovery

- Port Scanning Techniques
- TCP Connect/Full-Open Scan
  - Stealth Scan (Half-Open Scan)
  - Inverse TCP Flag Scan
  - Xmas Scan
  - TCP Maimon Scan
  - ACK Flag Probe Scan
  - IDLE/IPID Header Scan
  - UDP Scan
  - SCTP INIT Scan
  - SCTP COOKIE ECHO Scan
  - SSDP and List Scan
  - IPv6 Scan
  - Port Scanning with AI
  - Service Version Discovery with AI
  - Nmap Scan Time Reduction Techniques

OS Discovery (Banner Grabbing/OS Fingerprinting)

- OS Discovery/Banner Grabbing
- How to Identify Target System OS
  - OS Discovery using Nmap and Unicornscan
  - OS Discovery using Nmap Script Engine
  - OS Discovery using IPv6 Fingerprinting
  - OS Discovery with AI
- Create and run Custom Script to automate Network Scanning Tasks with AI

- **Scanning Beyond IDS and Firewall**
  - Packet Fragmentation
  - Source Routing
- **Source Port Manipulation**
  - IP Address Decoy
  - IP Address Spoofing
  - MAC Address Spoofing
  - Creating Custom Packets
  - Randomizing Host Order and Sending Bad Checksums
  - Proxy Servers
    - Proxy Chaining
    - Proxy Tools
  - Anonymizers
    - Censorship Circumvention Tools
- **Network Scanning Countermeasures**
  - Ping Sweep Countermeasures
  - Port Scanning Countermeasures
  - Banner Grabbing Countermeasures
  - IP Spoofing Detection Techniques
  - IP Spoofing Countermeasures
  - Scanning Detection and Prevention Tools

Module 4 Enumeration

Enumeration Concepts

- What is Enumeration?
- Techniques for Enumeration
- Services and Ports to Enumerate

NetBIOS Enumeration

- NetBIOS Enumeration Tools
- Enumerating User Accounts
- Enumerating Shared Resources using Net View
- NetBIOS Enumeration using AI

SNMP Enumeration

- Working of SNMP
- Management Information Base (MIB)
- Enumerating SNMP using SnmpWalk and Nmap
- Enumerating SNMP using Nmap
- SNMP Enumeration Tools
- SNMP Enumeration with SnmpWalk and Nmap using AI

LDAP Enumeration

- Manual and Automated LDAP Enumeration
- LDAP Enumeration Tools

NTP and NFS Enumeration

- NTP Enumeration
- NTP Enumeration Commands and Tools
- NFS Enumeration
- NFS Enumeration Tools

SMTP and DNS Enumeration

- SMTP Enumeration
- SMTP Enumeration using Nmap
- SMTP Enumeration using Metasploit
- SMTP Enumeration Tools
- SMTP Enumeration using AI
- DNS Enumeration using Zone Transfer
- DNS Cache Snooping
- DNSSEC Zone Walking
- DNS Enumeration using OWASP Amass
- DNS and DNSSEC Enumeration using Nmap
- DNS Enumeration with Nmap using AI
- DNS Cache Snooping using AI

Other Enumeration Techniques

- IPsec Enumeration with AI
- VoIP Enumeration
- RPC Enumeration
- Unix/Linux User Enumeration
- SMB Enumeration with AI
- Create and run Custom Script to automate Network Enumeration Tasks with AI

Enumeration Countermeasures

Module 5 Vulnerability Analysis

Vulnerability Assessment Concepts

- Vulnerability Classification
  - Misconfigurations/Weak Configurations
  - Application Flaws
  - Poor Patch Management
  - Design Flaws
  - Third-Party Risks
  - Default Installations/Default Configurations
  - Operating System Flaws
  - Default Passwords
  - Zero-Day Vulnerabilities
  - Legacy Platform Vulnerabilities
  - System Sprawl/Undocumented Assets
  - Improper Certificate and Key Management
- Vulnerability Scoring Systems and Databases
  - Common Vulnerability Scoring System (CVSS)
  - Common Vulnerabilities and Exposures (CVE)
  - National Vulnerability Database (NVD)
  - Common Weakness Enumeration (CWE)
- Vulnerability-Management Life Cycle
  - Pre-assessment Phase
  - Vulnerability Assessment Phase
  - Post-Assessment Phase

- Vulnerability Research
  - → Resources for Vulnerability Research
- Vulnerability Scanning and Analysis
  - → Types of Vulnerability Scanning

Vulnerability Assessment Tools

- Comparing Approaches to Vulnerability Assessment
- Characteristics of a good Vulnerability Assessment Solution
- Working of Vulnerability Scanning Solutions
- Types of Vulnerability Assessment Tools
- Choosing a Vulnerability Assessment Tool
- Criteria for choosing a Vulnerability Assessment Tool
- Best Practices for selecting Vulnerability Assessment Tools
- Vulnerability Assessment Tools
  - → Nessus Essentials
  - → GFI LanGuard
  - → OpenVAS
  - → Nikto
  - → Qualys Vulnerability Management
- AI-Powered Vulnerability Assessment Tools
- Vulnerability Assessment using AI
- Vulnerability Scan using Nmap with AI
- Vulnerability Assessment using Python Script with AI
- Vulnerability Scan using Skipfish with AI

Vulnerability Assessment Reports

- Components of a Vulnerability Assessment Report

Module 6 System Hacking

Gaining Access

- Cracking Passwords
  - Microsoft Authentication
  - How Hash Passwords are stored in Windows SAM?
  - Tools to extract the Password Hashes
  - NTLM Authentication Process
  - Kerberos Authentication
  - Password Cracking
  - Types of Password Attacks
    - Non-Electronic Attacks
    - Active Online Attacks
    - Other Active Online Attacks
    - Passive Online Attacks
    - Offline Attacks
  - Password Recovery Tools
  - Password-Cracking Tools
  - Password Salting
  - How to Defend Against Password Cracking
  - How to Defend Against LLMNR/NBT-NS Poisoning
  - Tools to Detect LLMNR/NBT-NS Poisoning
  - Detecting SMB Attacks against Windows
- Vulnerability Exploitation
  - Exploit Sites
  - Windows Exploit Suggester – Next Generation (WES-NG)
  - Metasploit Framework

- Exploit Sites
- Windows Exploit Suggester – Next Generation (WES-NG)
- Metasploit Framework
- Metasploit Modules
- AI-Powered Vulnerability Exploitation Tools
- Buffer Overflow
  - Types of Buffer Overflow
  - Simple Buffer Overflow in C
  - Windows Buffer Overflow Exploitation
- Return-Oriented Programming (ROP) Attack
- Bypassing ASLR and DEP Security Mechanisms
- Heap Spraying
- IT Spraying
- Exploit Chaining
- Domain Mapping and Exploitation with BloodHound
- Post AD Enumeration using PowerView
- Identifying insecurities using GhostPack Seatbelt
- Buffer Overflow Detection Tools
- Defending Against Buffer Overflow

Escalating Privileges

- Privilege Escalation
- Privilege Escalation using DLL Hijacking
- Privilege Escalation by Exploiting Vulnerabilities
- Privilege Escalation using Dll Injection
- Privilege Escalation using Spectre and Meltdown Vulnerabilities
- Privilege Escalation using Named Pipe Impersonation
- Privilege Escalation by Exploiting Misconfigured Services
- Pivoting and Relaying to Hack External Machines

- Privilege Escalation using Misconfigured NFS
- Privilege Escalation by Bypassing User Account Control (UAC)
- Privilege Escalation by Abusing Boot or Logon Initialization Scripts
- Privilege Escalation by Modifying Domain Policy
- Privilege Escalation by Modifying Other Domain Controllers Group Policies
- Privilege Escalation by Abusing Active Directory Certificate Services (AD CS)
- Other Privilege Escalation Techniques
- Privilege Escalation Tools
- How to Defend Against Privilege Escalation
  - Tools for defending against DLL and Dylib Injection
  - Defending against Spectre and Meltdown Vulnerabilities
  - Tools for detecting Spectre and Meltdown Vulnerabilities

Maintaining Access

- Executing Applications
  - Remote Code Execution Techniques
  - Keyloggers
    - Types of Keystroke Loggers
    - Remote Keylogger Attacks Using Metasploit
    - Hardware Keyloggers
    - Keyloggers for Windows
    - Keyloggers for macOS
    - How to defend against Keyloggers

- Anti-Keyloggers
- Spyware
  - Spyware Tools
  - Types of Spyware
  - How to defend against Spyware
- Anti-Spyware

✓ Hiding Files

- Rootkits
  - Types of Rootkits
  - How a Rootkit works
  - Popular Rootkits
  - Steps for detecting Rootkits
  - How to defend against Rootkits
  - Anti-Rootkits
- NTFS Data Streams
  - How to create NTFS Streams
  - NTFS Stream Manipulation
  - How to defend against NTFS Streams
  - NTFS Stream Detectors
- What is Steganography?
  - Classification of Steganography
  - Types of Steganography based on Cover Medium
  - Whitespace Steganography
  - Image Steganography
  - Document Steganography
  - Video Steganography
  - Audio Steganography

- Audio Steganography
- Folder Steganography
- Spam/Email Steganography
- Other Types of Steganography
- Steganalysis
- Steganalysis Methods/Attacks on Steganography

→ Detecting Steganography (Text, Image, Audio, and Video Files)

→ Steganography Detection Tools

✓ Establishing Persistence

→ Maintaining Persistence using Windows Sticky Keys

→ Maintaining Persistence by abusing Boot or Logon Autostart Executors

→ Domain Dominance through different Paths

- Remote Code Execution
- Abusing Data Protection API (DPAPI)
- Malicious Replication
- Skeleton Key Attack
- Golden Ticket Attack
- Silver Ticket Attack

→ Maintain Domain Persistence through AdminSDHolder

→ Maintaining Persistence through WMI Event Subscription

→ Overpass-the-Hash Attack

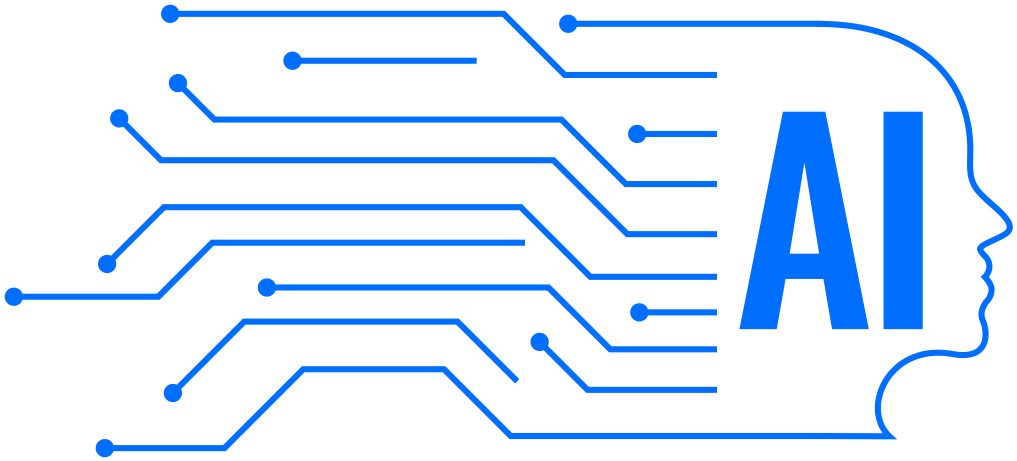
→ Linux Post-Exploitation

→ Windows Post-Exploitation

→ How to defend against Persistence Attacks

Clearing Logs

- Covering Tracks
- Disabling Auditing: Auditpol
- Clearing Logs
- Manually clearing Event Logs
- Ways to clear Online Tracks
- Covering BASH Shell Tracks
- Covering Tracks on a Network
- Covering Tracks on an OS
- Disable File using Cipher.exe
- Disable Windows Functionality
- Deleting Windows Activity History
- Deleting Incognito History
- Hiding Artifacts in Windows, Linux, and macOS
- Anti-Forensics Techniques
- Track-Covering Tools
- Defending against Covering Tracks



Module 7 Malware Threats

Malware Concepts

- Introduction to Malware
  - Different ways for Malware to enter a system
  - Common techniques Attackers use to distribute Malware on the Web
- Components of Malware
- Potentially Unwanted Application or Applications (PUAs)
  - Adware

APT Concepts

- What are Advanced Persistent Threats?
  - Characteristics of Advanced Persistent Threats
  - Advanced Persistent Threat Lifecycle

Trojan Concepts

- What is a Trojan?
- How Hackers use Trojans
- Common Ports used by Trojans
- Types of Trojans
  - Remote Access Trojans
  - Backdoor Trojans
  - Rootkit Trojans
  - Botnet Trojans
  - E-banking Trojans
    - Working of E-banking Trojans
    - E-banking Trojan: CHAVECLOAK

- Point-of-Sale Trojans
- Defacement Trojans
- Service Protocol Trojans
- Mobile Trojans
- IoT Trojans
- Security Software Disabler Trojans
- Destructive Trojans
- DDoS Trojans
- Command Shell Trojans

✓ How to Infect Systems using a Trojan

- Creating a Trojan
- Deploying a Dropper or Downloader
- Employing a Wrapper
- Employing a Crypter
- Propagating and Deploying a Trojan
- Deploying a Trojan through Email Channels
- Deploy a Trojan through Covert Channels
- Deploying a Trojan through Proxy Servers
- Deploying a Trojan through USB/Flash Drives
- Techniques for Evading Antivirus Software
- Exploit Kits

Viruses and Worms

- Introduction to Viruses
  - Stages of Virus Lifecycle
  - Working of Viruses
- How does a Computer get Infected by Viruses?
- Types of Viruses
  - System or Boot Sector Viruses
  - File Viruses
  - Multipartite Viruses
  - Macro Viruses
  - Cluster Viruses
  - Stealth Viruses/Tunneling Viruses
  - Encrypted Viruses
  - Polymorphic Viruses
  - Metamorphic Viruses
  - Overwriting File or Cavity Viruses
  - Companion/Camouflage Viruses
  - Shell Viruses
  - File Extension Viruses
  - FAT Viruses
  - Logic Bomb Viruses
  - Web Scripting Viruses
  - E-mail Viruses
  - Armored Viruses
  - Add-on Viruses
  - Intrusive Viruses
  - Direct Action or Transient Viruses
  - Terminate and Stay Resident (TSR) Viruses

- How to infect Systems using a Virus
  - Propagating and Deploying a Virus
  - Virus Hoaxes
  - Fake AntiVirus
- Ransomware
  - How to infect Systems using a Ransomware: Creating Ransomware
- Computer Worms
  - How to infect Systems using a Worm
  - Worm Makers

Fileless Malware Concepts

- What is Fileless Malware?
  - Taxonomy of Fileless Malware Threats
- How does Fileless Malware Work?
- Launching Fileless Malware through Document Exploits/In-Memory Exploits/ Script-based Injection/Exploiting System Admin Tools/Phishing/ Windows Registry/
- Fileless Malware Obfuscation Techniques to Bypass Antivirus

AI-based Malware Concepts

- What is AI-based Malware?
  - Working of AI-based Malware
- Indicators of AI-based Malware
- Challenges of AI-based Malware
- Techniques used in AI-based Malware Development
  - Generative Adversarial Networks (GANs)
  - Reinforcement Learning
  - Natural Language Processing (NLP)

- Examples of AI-based Malware
  - AI-Generated Videos: Malware spread through YouTube

Malware Analysis

- What is a Sheep Dip Computer?
- Antivirus Sensor Systems
- Malware Analysis Procedure
- Preparing Testbed
- Static Malware Analysis
  - File Fingerprinting
  - Local and Online Malware Scanning
  - Performing Strings Search
  - Identifying Packing/Obfuscation Methods
  - Finding the Portable Executables (PE) Information
  - Identifying File Dependencies
  - Malware Disassembly
  - Analyzing ELF Executable Files
  - Analyzing Mach Object (Mach-O) Executable Files
  - Analyzing Malicious MS Office Documents
  - Analyzing Suspicious PDF Document
  - Analyzing Suspicious Documents using YARA
- Dynamic Malware Analysis
  - Port Monitoring
  - Process Monitoring
  - Registry Monitoring
  - Windows Services Monitoring
  - Startup Programs Monitoring
  - Event Logs Monitoring/Analysis
  - Installation Monitoring
  - Files and Folders Monitoring

- Device Drivers Monitoring
- Network Traffic Monitoring/Analysis
- DNS Monitoring/Resolution
- API Calls Monitoring
- System Calls Monitoring
- Scheduled Tasks Monitoring
- Browser Activity Monitoring

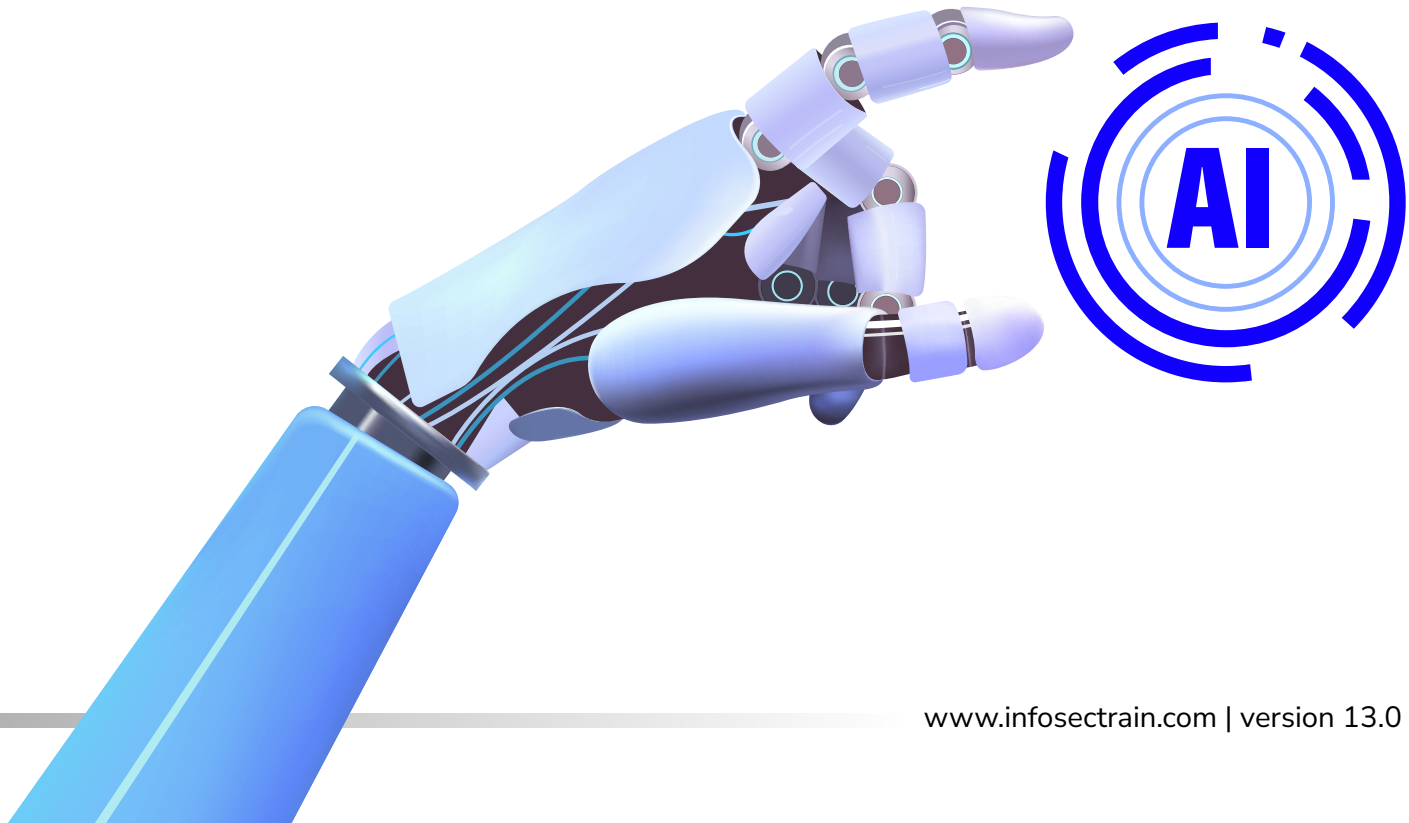
- Virus Detection Methods
- Malware Code Emulation
- Malware Code Instrumentation
- Trojan Analysis: Coyote
  - Coyote Malware Attack Phases
- Virus Analysis: GhostLocker 2.0
  - GhostLocker 2.0 Malware Attack Phases
- Fileless Malware Analysis: PyLoose
  - PyLoose Malware Attack Phases
- AI-based Malware Analysis: FakeGPT
  - FakeGPT Malware Attack Phases

Malware Countermeasures

- Trojan Countermeasures
- Backdoor Countermeasures
- Virus and Worm Countermeasures
- Fileless Malware Countermeasures
- AI-based Malware Countermeasures
- Adware Countermeasures
- APT Countermeasures

Anti-Malware Software

- Anti-Trojan Software
- Antivirus Software
- Fileless Malware Detection Tools
- Fileless Malware Protection Tools
- AI-Powered Malware Detection and Analysis Tools
- Endpoint Detection and Response (EDR/XDR) Tools



Module 8 Sniffing

Sniffing Concepts

- Network Sniffing
- How a Sniffer works
- Types of Sniffing: Passive/Active Sniffing
- Protocols Vulnerable to Sniffing
- Sniffing in the Data Link Layer of the OSI Model
- Hardware Protocol Analyzers
- SPAN Port
- Wiretapping
- Lawful Interception

Sniffing Technique

- MAC Attacks
  - MAC Address/CAM Table
  - How CAM Works?
  - What happens when a CAM Table is full?
  - MAC Flooding
  - Switch Port Stealing
  - How to defend against MAC Attacks
- DHCP Attacks
  - How DHCP works
  - DHCP Request/Reply Messages
  - IPv4 DHCP Packet Format
  - DHCP Starvation Attack
  - Rogue DHCP Server Attack
  - DHCP Attack Tools
  - How to defend against DHCP Starvation and Rogue Server Attacks

- ARP Poisoning
  - What Is Address Resolution Protocol (ARP)?
  - ARP Spoofing Attack
  - Threats of ARP Poisoning
  - ARP Spoofing/Poisoning Tools
  - How to defend against ARP Poisoning
  - Configuring DHCP Snooping and Dynamic ARP Inspection on Cisco Switches
  - ARP Spoofing Detection Tools
- Spoofing Attacks
  - MAC Spoofing/Duplicating
  - MAC Spoofing Technique: Windows
  - MAC Spoofing Tools
  - IRDP Spoofing
  - VLAN Hopping
  - STP Attack
  - How to defend against MAC Spoofing
  - How to defend against VLAN Hopping
  - How to defend against STP Attacks
- DNS Poisoning
  - DNS Poisoning Techniques
    - Intranet DNS Spoofing
    - Internet DNS Spoofing
    - Proxy Server DNS Poisoning
    - DNS Cache Poisoning
  - DNS Poisoning Tools
  - How to defend against DNS Spoofing

- **Sniffing Tools**
  - Wireshark
    - Follow TCP Stream in Wireshark
    - Display Filters in Wireshark
    - Additional Wireshark Filters
  - Sniffing Tools
- **Sniffing Countermeasures**
  - How to defend against Sniffing
  - How to detect Sniffing
  - Sniffer Detection Techniques
  - Promiscuous Detection Tools

Module 9 Social Engineering

Social Engineering Concepts

- What is Social Engineering?
  - Common Targets of Social Engineering
  - Impact of Social Engineering Attack on an organization
  - Behaviors Vulnerable to Attacks
  - Factors that make companies vulnerable to attacks
  - Why is Social Engineering Effective?
- Phases of a Social Engineering Attack
- Types of Social Engineering

Human-based Social Engineering Techniques

- Impersonation
- Impersonation (Vishing)
- Eavesdropping
- Shoulder Surfing
- Dumpster Diving
- Reverse Social Engineering
- Piggybacking
- Tailgating
- Diversion Theft
- Honey Trap
- Baiting
- Quid Pro Quo
- Elicitation
- Bait and Switching

Computer-based Social Engineering Techniques

- Phishing (Types/Tools/Examples)
- Crafting Phishing Emails with ChatGPT
- Perform Impersonation using AI: Create Deepfake Videos
- Perform Impersonation using AI: Voice Cloning
- Impersonation on Facebook
- Perform Impersonation on Social Networking Sites
- Social Networking Threats to Corporate Networks
- Identity Theft (Types/Techniques/Indicators of Identity Theft)

Mobile-based Social Engineering Techniques

- Publishing Malicious Apps
- Repackaging Legitimate Apps
- Fake Security Applications
- QRLJacking
- SMiShing (SMS Phishing)

Social Engineering Countermeasures

- Social Engineering Countermeasures
- How to defend against Phishing Attacks?
- Identity Theft Countermeasures
- Voice Cloning Countermeasures
- Deepfake Attack Countermeasures
- How to detect Phishing Emails?
- Anti-Phishing Toolbar
- Common Social Engineering targets and defense strategies
- Audit Organization's Security for Phishing Attacks using OhPhish

Module 10 Denial-of-Service

DoS/DDoS Concepts

- What is DoS/DDoS Attack?
- How do DDoS Attacks Work?

Botnets

- Organized Cyber Crime: Organizational Chart
- Botnet
- A Typical Botnet Setup
- Botnet Ecosystem
- Scanning Methods for finding Vulnerable Machines
- How does Malicious Code propagate?

DDoS Case Study

- DDoS Attack
- Hackers Advertise Links for Downloading Botnets
- Use of Mobile Devices as Botnets for Launching DDoS Attacks
- DDoS case study: HTTP/2 ‘Rapid Reset’ Attack on Google Cloud

DoS/DDoS Attack Techniques

- Basic categories of DoS/DDoS Attack Vectors
- DoS/DDoS Attack Techniques
  - → UDP Flood Attack
  - → ICMP Flood Attack
  - → Ping of Death Attack
  - → Smurf Attack
  - → Pulse Wave DDoS Attack
  - → Zero-Day DDoS Attack

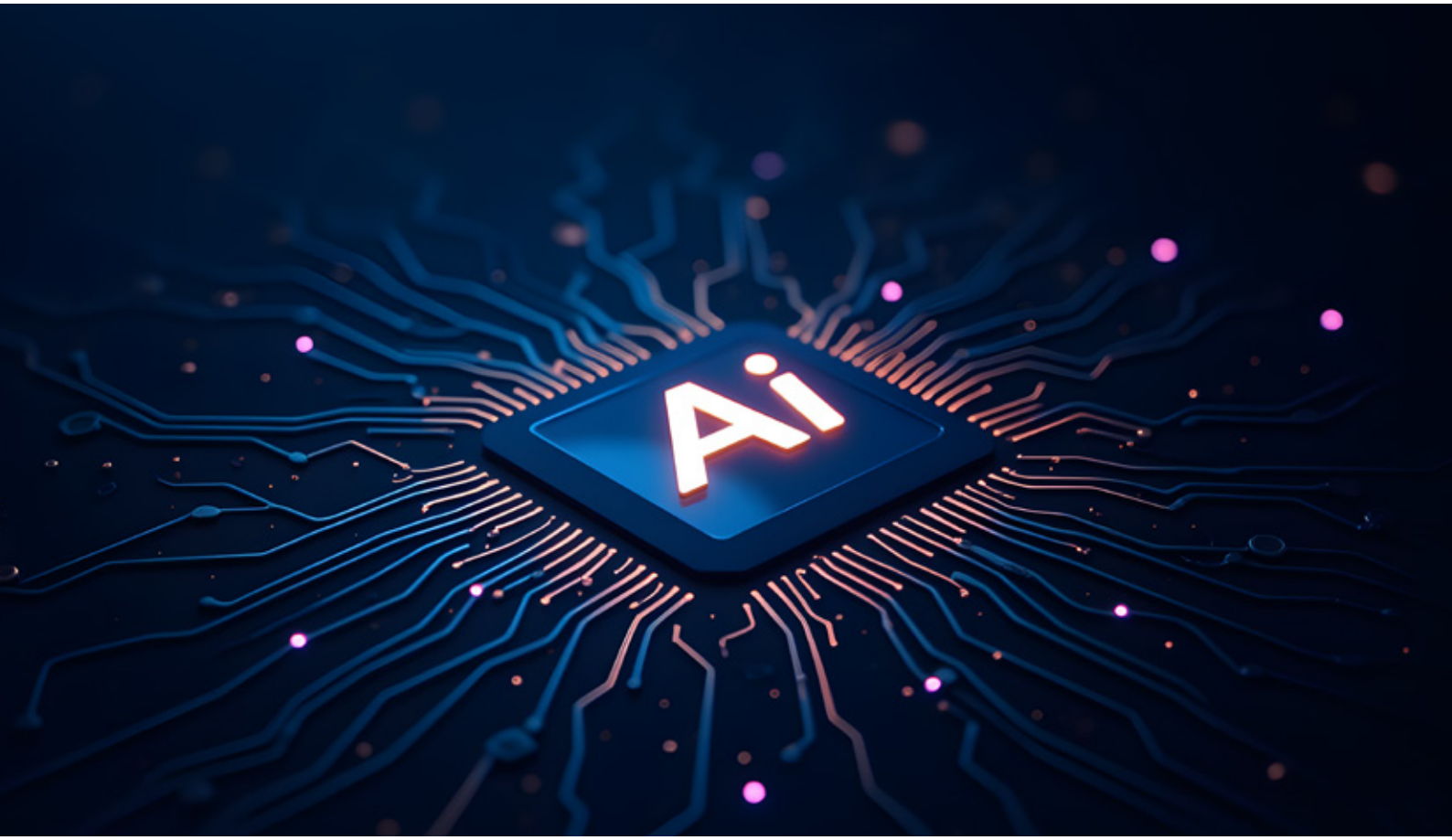
- NTP Amplification Attack
- SYN Flood Attack
- Fragmentation Attack
- Spoofed Session Flood Attack
- HTTP GET/POST Attack
- Slowloris Attack
- UDP Application Layer Flood Attack
- Multi-Vector Attack
- Peer-to-Peer Attack
- Permanent Denial-of-Service Attack
- TCP SACK Panic Attack
- Distributed Reflection Denial-of-Service (DRDoS) Attack
- DDoS Extortion/Ransom DDoS (RDoS) Attack

- DoS/DDoS Attack Toolkits in the Wild

DoS/DDoS Attack Countermeasures

- Detection Techniques
- DoS/DDoS Countermeasure Strategies
- DDoS Attack Countermeasures
  - Protect Secondary Victims
  - Detect and Neutralize Handlers
  - Prevent Potential Attacks
  - Deflect Attacks
  - Mitigate Attacks
  - Post-Attack Forensics

- Techniques to defend against Botnets
- Additional DoS/DDoS Countermeasures
- DoS/DDoS Protection at ISP Level
- Enabling TCP Intercept on Cisco IOS Software
- Advanced DDoS Protection Appliances
- DoS/DDoS Protection Tools/Services



Module 11 Session Hijacking

Session Hijacking Concepts

- What is Session Hijacking?
- Session Hijacking Process
- Packet Analysis of a Local Session Hijack
- Types of Session Hijacking
- Session Hijacking in OSI Model
- Spoofing vs. Hijacking

Application-Level Session Hijacking

- Compromising Session IDs using Sniffing
- Compromising Session IDs by predicting Session Token
  - → How to predict a Session Token
- Compromising Session IDs Using Man-in-theBrowser/Manipulator-in-the- Browser Attack
- Compromising Session IDs using Client-side Attacks
  - → Cross-site Script Attack
  - → Cross-site Request Forgery Attack
- Compromising Session IDs using Session Replay Attacks
- Compromising Session IDs using Session Fixation
- Session Hijacking using Proxy Servers/ CRIME Attack/ Forbidden Attack/ Session Donation Attack

- **Network-Level Session Hijacking**
  - Three-way Handshake
  - TCP/IP Hijacking
  - IP Spoofing: Source Routed Packets
  - RST Hijacking
  - Blind Hijacking
  - UDP Hijacking
  - MITM Attack using Forged ICMP and ARP Spoofing
  - PetitPotam Hijacking
- **Session Hijacking Tools**
- **Session Hijacking Countermeasures**
  - Session Hijacking Detection methods
  - Protecting against Session Hijacking
  - Web Development Guidelines to prevent Session Hijacking
  - Web User Guidelines to prevent Session Hijacking
  - Session Hijacking Detection Tools
  - Approaches to prevent Session Hijacking
  - Approaches to prevent MITM Attacks
  - IPsec
  - Session Hijacking Prevention Tools

Module 12 Evading IDS, Firewalls, and Honeypots

IDS, IPS, and Firewall Concepts

- Intrusion Detection System (IDS)
  - Intrusion Prevention System (IPS)
  - How does an IDS detect an Intrusion?
  - General Indications of Intrusions
  - Types of Intrusion Detection System (IDS)
  - Types of IDS Alerts
- Firewall
  - Firewall Architecture
  - Demilitarized Zone (DMZ)
  - Types of Firewalls
    - Types of Firewalls based on Configuration
    - Types of Firewalls based on Working Mechanism
    - Packet Filtering Firewall
    - Circuit-Level Gateway Firewall
    - Application-Level Firewall
    - Stateful Multilayer Inspection Firewall
    - Application Proxy
    - Network Address Translation (NAT)
    - Virtual Private Network
    - Next-Generation Firewalls (NGFWs)
    - Firewall Limitations

IDS, IPS, and Firewall Solutions

- Intrusion Detection using YARA Rules
- Intrusion Detection Tools
- Intrusion Prevention Tools
- Firewalls

Evading IDS/Firewalls

- IDS/Firewall Evasion Techniques
  - IDS/Firewall Identification
  - IP Address Spoofing
  - Source Routing
  - Tiny Fragments
  - Bypass Blocked Sites using an IP Address in place of a URL
  - Bypass Blocked Sites using Anonymous Website Surfing Sites
  - Bypass an IDS/Firewall using a Proxy Server
  - Bypassing an IDS/Firewall through the ICMP Tunneling method
  - Bypassing an IDS/Firewall through the ACK Tunneling method
  - Bypassing an IDS/Firewall through the HTTP Tunneling method
  - Bypassing Firewalls through the SSH Tunneling method
  - Bypassing Firewalls through the DNS Tunneling method
  - Bypassing an IDS/Firewall through External Systems
  - Bypassing an IDS/Firewall through MITM Attacks
  - Bypassing an IDS/Firewall through Content
  - Bypassing an IDS/WAF using an XSS Attack
  - Other Techniques for bypassing WAF
  - Bypassing an IDS/Firewall through HTML Smuggling
  - Evading an IDS/Firewall through Windows BITS

- Other Techniques for IDS Evasion
  - Insertion Attack
  - Evasion
  - Denial-of-Service Attack (DoS)
  - Obfuscating
  - False Positive Generation
  - Session Splicing
  - Unicode Evasion Technique
  - Fragmentation Attack
  - Time-To-Live Attacks
  - Urgency Flag
  - Invalid RST Packets
  - Polymorphic Shellcode
  - ASCII Shellcode
  - Application-Layer Attacks
  - Desynchronization
  - Domain Generation Algorithms (DGA)
  - Encryption
  - Flooding

Evading NAC and Endpoint Security

- NAC and Endpoint Security Evasion techniques
- Bypassing NAC using VLAN Hopping/Pre-authenticated Device
- Bypassing Endpoint Security using Ghostwriting/Application
- Whitelisting
- Bypassing Endpoint Security by Dechaining Macros
- Bypassing Endpoint Security by clearing Memory Hooks
- Bypassing Endpoint Security by Process Injection
- Bypassing the EDR using LoLBins

- Bypassing Endpoint Security by CPL (Control Panel) Side-Loading
- Bypassing Endpoint Security using ChatGPT
- Bypassing Antivirus using Metasploit Templates
- Bypassing Windows Antimalware Scan Interface (AMSI)
- Other Techniques for Bypassing Endpoint Security

IDS/Firewall Evading Tools

- Packet Fragment Generator Tools

Honeypot Concepts

- Types of Honeypots
- Honeypot Tools
- Detecting and Defeating Honeypots
- Honeypot Detection Tools

IDS/Firewall Evasion Countermeasures

- How to defend against IDS Evasion
- How to defend against Firewall Evasion
- How to defend against Endpoint Security Evasion
- How to defend against NAC Evasion
- How to defend against Anti-virus Evasion

Module 13 Hacking Web Servers

Web Server Concepts

- Web Server Operations
- Web Server Security issues
- Why are Web Servers Compromised?
- Apache Web Server Architecture
  - → Apache Vulnerabilities
- IIS Web Server Architecture
  - → IIS Vulnerabilities
- NGINX Web Server Architecture
  - → NGINX Vulnerabilities

Web Server Attacks

- DNS Server Hijacking
- DNS Amplification Attack
- Directory Traversal Attacks
- Website Defacement
- Web Server Misconfiguration
- HTTP Response-Splitting Attack
- Web Cache Poisoning Attack
- SSH Brute Force Attack
- FTP Brute Force with AI
- HTTP/2 Continuation Flood Attack
- Frontjacking Attack

- Other Web Server Attacks
  - Web Server Password Cracking
  - DoS/DDoS Attacks
  - Man-in-the-Middle Attack
  - Phishing Attacks
  - Web Application Attacks

Web Server Attack Methodology

- Information Gathering
  - Information Gathering from Robots.txt File
- Web Server Footprinting/Banner Grabbing
  - Web Server Footprinting Tools
  - Web Server Footprinting with AI
  - Web Server Footprinting using Netcat with AI
- IIS Information Gathering using Shodan
- Abusing Apache mod_userdir to Enumerate User Accounts
- Enumerating Web Server Information using Nmap
- Finding Default Credentials of Web Server
- Directory Brute Forcing with AI
- NGINX Vulnerability Scanning using NginxPwner
- Finding Exploitable Vulnerabilities with AI
- Session Hijacking
- Web Server Password Hacking
- Using Application Server as a Proxy
- Path Traversal via Misconfigured NGINX Alias
- Web Server Attack Tools

Web Server Attack Countermeasures

- Place Web Servers in Separate Secure Server Security Segment on Network
- Countermeasures: Patches and Updates
- Countermeasures: Protocols and Accounts
- Countermeasures: Files and Directories
- Detecting Web Server Hacking Attempts
- How to defend against Web Server Attacks
- How to defend against HTTP Response-Splitting and Web Cache Poisoning
- How to defend against DNS Hijacking
- Web Application Security Scanners
- Web Server Security Scanners
- Web Server Malware Infection Monitoring Tools
- Web Server Security Tools
- Web Server Pentesting Tools

Patch Management

- Patches and Hotfixes
- What is Patch Management?
- Installation of a Patch
- Patch Management Best Practices
- Patch Management Tools

Module 14 Hacking Web Applications

Web Application Concepts

- Introduction to Web Applications
- Web Application Architecture
- Web Services
- Vulnerability Stack

Web Application Threats

- OWASP Top 10 Application Security Risks – 2021
  - A01 – Broken Access Control
  - A02 – Cryptographic Failures/Sensitive Data Exposure
  - A03 – Injection Flaws
  - A04 – Insecure Design
  - A05 – Security Misconfiguration
  - A06 – Vulnerable and Outdated Components/Using Components with Known Vulnerabilities
  - A07 – Identification and Authentication Failures/Broken Authentication
  - A08 – Software and Data Integrity Failures
  - A09 – Security Logging and Monitoring Failures/Insufficient Logging and Monitoring
  - A10 – Server-Side Request Forgery (SSRF)
- Web Application Attacks
  - Directory Traversal
  - Hidden Field Manipulation Attack
  - Pass-the-Cookie Attack
  - Same-Site Attack
  - SQL Injection Attacks

- Command Injection Attacks
- Command Injection Example
- File Injection Attack
- LDAP Injection Attacks
- Other Injection Attacks
- Cross-Site Scripting (XSS) Attacks
- Cross-Site Scripting Attack Scenario: Attack via Email
- XSS Attack in Blog Posting
- XSS Attack in Comment Field
- Techniques to evade XSS Filters
- Web-based Timing Attacks
- XML External Entity (XXE) Attack
- Unvalidated Redirects and Forwards
- Magecart Attack
- Watering Hole Attack
- Cross-Site Request Forgery (CSRF) Attack
- Cookie/Session Poisoning
- Insecure Deserialization
- Web Service Attack
- Web Service Footprinting Attack
- Web Service XML Poisoning
- DNS Rebinding Attack
- Clickjacking Attack
- MarioNet Attack

Web Application Hacking Methodology

- ✓ Footprint Web Infrastructure
  - Server Discovery
  - Server Discovery: Banner Grabbing

- Port and Service Discovery
- Detecting Web App Firewalls and Proxies on Target Site
- WAF Detection with AI
- Hidden Content Discovery
- Detect Load Balancers
  - Detecting Load Balancers using AI
- Detecting Web App Technologies
- WebSockets Enumeration

✓ Analyze Web Applications

- Website Mirroring
- Website Mirroring with AI
- Website Mirroring using Httrack with AI
- Identify Entry Points for User Input
- Identify Server-Side Technologies using AI
- Identify Files and Directories with AI
- Identify Web Application Vulnerabilities with AI

✓ Bypass Client-Side Controls

- Attack Hidden Form Fields
- Attack Browser Extensions
- Attack Google Chrome Browser Extensions
- Perform Source Code Review

✓ Attack Authentication Mechanism

- Design Flaws in Authentication Mechanism
- Implementation Flaws in Authentication Mechanism
- Username Enumeration
- Password Attacks: Password Functionality Exploits

- → Password Attacks: Brute-forcing
- → Password Attacks: Attack Password Reset Mechanism
- → Authorization Attack: HTTP Request Tampering
- → Session Attacks: Session ID Prediction/Brute Forcing
- → Cookie Exploitation: Cookie Poisoning
- → Bypass Authentication: Bypass SAML-based SSO
- → Bypass Authentication: Bypass Rate Limit
- → Bypass Authentication: Bypass Multi-Factor Authentication

✓ Attack Authentication Schemes

- → Authorization Attack
- → HTTP Request Tampering
- → Cookie Parameter Tampering

✓ Attack Access Controls

- → Exploiting Insecure Access Controls
- → Access Controls Attack Methods

✓ Attack Session Management Mechanism

- → Session Management Attack
- → Attacking Session Token Generation Mechanism
- → Attacking Session Tokens Handling Mechanism: Session Token Sniffing
- → Manipulating WebSocket Traffic

✓ Perform Injection/Input Validation Attacks

- → Injection Attacks/Input Validation Attacks
- → Perform Local File Inclusion (LFI)

✓ Attack Application Logic Flaws

✓ Attack Shared Environments

- Attack Database Connectivity
  - Connection String Injection
  - Connection String Parameter Pollution (CSPP) Attacks
  - Connection Pool DoS
- Attack Web Application Client
- Attack Web Services
  - Web Services Probing Attacks
  - Web Service Attacks: SOAP Injection
  - Web Service Attacks: SOAPAction Spoofing
  - Web Service Attacks: WS-Address Spoofing
  - Web Service Attacks: XML Injection
  - Web Services Parsing Attacks
  - Web Service Attack Tools
- Create and run custom Scripts to automate Web Application Hacking Tasks with AI

Web API and Webhooks

- Web API
  - Web Service APIs
- Webhooks
- OWASP Top 10 API Security Risks
- Webhooks Security Risks
- API Vulnerabilities
- Web API Hacking Methodology
  - Identify the Target
  - Detect Security Standards
  - API Enumeration
  - Identify the Attack Surface

- → Launch Attacks
- → REST API Vulnerability Scanning
- → Bypassing IDOR via Parameter Pollution

- ✓ Secure API Architecture
- ✓ API Security Risks and Solutions
- ✓ Best Practices for API Security
- ✓ Best Practices for Securing Webhooks

Web Application Security

- ✓ Web Application Security Testing
- ✓ Web Application Fuzz Testing
  - → Web Application Fuzz Testing with AI
  - → AI-Powered Fuzz Testing
- ✓ AI-Powered Static Application Security Testing (SAST)
- ✓ AI-Powered Dynamic Application Security Testing (DAST)
- ✓ Source Code Review
- ✓ Encoding Schemes
- ✓ Whitelisting vs. Blacklisting Applications
- ✓ Application Whitelisting and Blacklisting Tools
- ✓ Content Filtering Tools
- ✓ How to defend against Injection Attacks
- ✓ Web Application Attack Countermeasures
- ✓ How to defend against Web Application Attacks
- ✓ Best Practices for Securing WebSocket Connections
- ✓ RASP for protecting Web Servers
- ✓ Web Application Security Testing Tools
- ✓ Web Application Firewalls

Module 15 SQL Injections

SQL Injection Concepts

- What is SQL Injection?
- SQL Injection and Server-side Technologies
- Understanding HTTP POST Request
- Understanding Normal SQL Query
- Understanding an SQL Injection Query—Code Analysis
- Example of a Web Application Vulnerable to SQL Injection: BadProductList.aspx
- Example of a Web Application Vulnerable to SQL Injection: Attack Analysis
- Examples of SQL Injection

Types of SQL Injection

- In-Band SQL Injection
  - → Error Based SQL Injection
  - → Union SQL Injection
- Blind/Inferential SQL Injection
  - → No Error Message Returned
  - → Time-based SQL Injection
  - → Boolean Exploitation
  - → Heavy Query
- Out-of-Band SQL injection

SQL Injection Methodology

- Information gathering and SQL Injection Vulnerability detection
  - Information Gathering
  - Identifying Data Entry Paths
  - Extracting Information through Error Messages
  - SQL Injection Vulnerability Detection
  - Additional methods to detect SQL Injection
  - SQL Injection Black Box Pen Testing
  - Source Code Review to detect SQL Injection Vulnerabilities
  - Testing for Blind SQL Injection Vulnerability in MySQL and MSSQL
- Launch SQL Injection Attacks
  - Perform Error based SQL Injection
  - Perform Error based SQL Injection using Stored Procedure Injection
  - Perform Union SQL Injection
  - Bypass Website Logins using SQL Injection
  - Perform Blind SQL Injection — Boolean Exploitation (MySQL)
  - Blind SQL Injection — Extract Database User
  - Blind SQL Injection — Extract Database Name
  - Blind SQL Injection — Extract Column Name
  - Blind SQL Injection — Extract Data from ROWS
  - Exporting a Value with Regular Expression Attack
  - Perform Double Blind SQL Injection
  - Perform Blind SQL Injection using Out-of-Band Exploitation
  - Technique
  - Exploiting Second-Order SQL Injection
  - Bypass Firewall to Perform SQL Injection
  - Bypassing WAF using JSON-Based SQL Injection Attack
  - Perform SQL Injection to insert a New User and update Password

- Advanced SQL Injection
  - Database, Table, and Column Enumeration
  - Advanced Enumeration
  - Creating Database Accounts
  - Password Grabbing
  - Grabbing SQL Server Hashes
  - Transfer Database to Attacker's Machine
  - Interacting with the Operating System
  - Interacting with the File System
  - Network Reconnaissance using SQL Injection
  - Network Reconnaissance Full Query
  - Finding and Bypassing Admin Panel of a Website
  - PL/SQL Exploitation
  - Creating Server Backdoors using SQL Injection
  - HTTP Header-Based SQL Injection
  - DNS Exfiltration using SQL Injection
  - MongoDB Injection/NoSQL Injection Attack
- SQL Injection Tools
- Discovering SQL Injection Vulnerabilities with AI
- Checking for Boolean based SQL Injection with AI
- Checking for Error based SQL Injection with AI
- Checking for Time-based SQL Injection with AI
- Checking for UNION based SQL Injection with AI

Evasion Techniques

- Evading IDS
- Types of Signature Evasion Techniques
  - In-line Comment and Char Encoding
  - String Concatenation and Obfuscated Code
  - Manipulating White Spaces and Hex Encoding
  - Sophisticated Matches and URL Encoding
  - Null Byte and Case Variation
  - Declare Variables and IP Fragmentation
  - Variation

SQL Injection Countermeasures

- How to defend against SQL Injection Attacks
- Defenses in the Application
- Detecting SQL Injection Attacks
- SQL Injection Detection Tools

Module 16 Hacking Wireless Networks

Wireless Concepts

- Wireless Terminology
- Wireless Networks
- Wireless Standards
- Service Set Identifier (SSID)
- Wi-Fi Authentication Process
- Types of Wireless Antennas

Wireless Encryption

- Wired Equivalent Privacy (WEP)
- Wi-Fi Protected Access (WPA)
- WPA2
- WPA3
- Comparison of WEP, WPA, WPA2, and WPA3
- Issues with WEP, WPA, WPA2, and WPA3

Wireless Threats

- Access control/ Integrity/ Confidentiality/
- Availability/Authentication/ Honeypot AP/ Wormhole/ Sinkhole/
- Inter-Chip Privilege Escalation/ Wireless Co-Existence Attack

Wireless Hacking Methodology

- Wi-Fi Discovery
  - → Wireless Network Footprinting
  - → Finding Wi-Fi Networks in range to Attack
  - → Wi-Fi Discovery Tools
  - → Mobile-based Wi-Fi Discovery Tools
  - → Finding WPS-Enabled APs

- ✔ Wireless Traffic Analysis
  - → Choosing the Optimal Wi-Fi Card
  - → Perform Spectrum Analysis
- ✔ Launch of Wireless Attacks
  - → Airocrack-ng Suite
  - → Detection of Hidden SSIDs
  - → Denial-of-Service
  - → Man-in-the-Middle Attack
  - → MITM Attack using Aircrack-ng
  - → MAC Spoofing Attack
  - → Wireless ARP Poisoning Attack
  - → ARP Poisoning Attack using Ettercap
  - → Rogue APs
  - → Creation of a Rogue AP using MANA Toolkit
  - → Evil Twin
  - → Key Reinstallation Attack (KRACK)
  - → Wi-Fi Jamming Signal Attack
  - → Wi-Fi Jamming Devices
  - → deAUTH Attack
  - → Wi-Jacking Attack
  - → RFID Cloning Attack
  - → WPA/WPA2 Encryption Cracking
  - → Cracking WPA/WPA2 using Aircrack-ng
  - → WPA Brute Forcing using Fern WiFi Cracker
  - → WPA3 Encryption Cracking
  - → Cracking WPA3 using Aircrack-ng and hashcat
  - → Cracking WPA3 using Reaver

Wireless Attack Countermeasures

- Defense against WPA/WPA2/WPA3 Cracking
- Defense against KRACK Attacks
- Defense against aLTEr Attacks
- Detection and Blocking of Rogue APs
- Defense against Wireless Attacks
- Wireless Intrusion Prevention Systems
- WIPS Deployment
- Wi-Fi Security Auditing Tools
- Wi-Fi IPSs

Module 17 Hacking Mobile Platforms

Mobile Platform Attack Vectors

- Vulnerable areas in Mobile Business Environment
- OWASP Top 10 Mobile Risks - 2024
- Anatomy of a Mobile Attack
- How a Hacker can profit from Mobile Devices that are successfully Compromised
- Mobile Attack Vectors and Mobile Platform Vulnerabilities
- Security Issues Arising from App Stores
- App Sandboxing Issues
- Mobile Spam
- SMS Phishing Attack (SMiShing)
- Pairing Mobile Devices on Open Bluetooth and Wi-Fi Connections
- Agent Smith Attack
- Exploiting SS7 Vulnerability
- Simjacker: SIM Card Attack
- Call Spoofing
- OTP Hijacking/Two-Factor Authentication Hijacking
- OTP Hijacking Tools
- Camera/Microphone Capture Attacks
- Camera/Microphone Hijacking Tools

Hacking Android OS

- Android OS
  - → Android Device Administration API

- Android Rooting
  - Rooting Android using KingoRoot
  - Android Rooting Tools
- Hacking Android Devices
  - Identifying Attack Surfaces using drozer
  - Bypassing FRP on Android Phones using 4ukey
  - Hacking with zANTI and Kali NetHunter
  - Launch DoS Attack using Low Orbit Ion Cannon (LOIC)
  - Hacking with Orbot Proxy
  - Exploiting Android Device through ADB using PhoneSploit Pro
  - Launching Man-in-the-Disk Attack
  - Launching Spearphone Attack
  - Exploiting Android Devices using Metasploit
  - Analyzing Android Devices
  - Other Techniques for Hacking Android Devices
  - Android Malware
- Android Hacking Tools
- Android-based Sniffers
- Securing Android Devices
- Android Security Tools
  - Android Device Tracking Tools
  - Android Vulnerability Scanners
  - Static Analysis of Android APK
  - Online Android Analyzers

Hacking iOS

- Apple iOS
- Jailbreaking iOS-
  - Jailbreaking Tools and Techniques
  - Jailbreaking iOS using Hexxa Plus
- Hacking iOS Devices
  - Hacking using Spyzie
  - iOS Trustjacking
  - Post-exploitation on iOS Devices using SeaShell Framework
  - Analyzing and Manipulating iOS Applications
  - Analyzing iOS Devices
  - iOS Malware
  - iOS Hacking Tools
- Securing iOS Devices
- iOS Device Security Tools
- iOS Device Tracking Tools

Mobile Device Management

- Mobile Device Management (MDM)
- Mobile Device Management Solutions
- Bring Your Own Device (BYOD)
  - BYOD Risks
  - BYOD Policy Implementation
  - BYOD Security Guidelines

Mobile Security Guidelines

- Mobile Security Guidelines
- OWASP Top 10 Mobile Risks and Solutions
- General guidelines for Mobile Platform Security
- Mobile Device Security guidelines for the Administrator
- SMS Phishing Countermeasures
- OTP Hijacking Countermeasures
- Critical Data Storage in Android and iOS: KeyStore and Keychain
- Recommendations
- Reverse Engineering Mobile Applications

Mobile Security Tools

- Source Code Analysis Tools
- Reverse Engineering Tools
- App Repackaging Detectors
- Mobile Protection Tools
- Mobile Anti-Spyware
- Mobile Pen Testing Toolkits

Module 18 IoT Hacking & OT Hacking

- **IoT Hacking**
- **IoT Concepts and Attacks**
  - What is the IoT?
  - How the IoT works
  - IoT Architecture
    - → IoT Application Areas and Devices
  - IoT Technologies and Protocols
  - IoT Communication Models
  - Challenges of IoT
    - → Threat vs Opportunity
    - → IoT Security Problems
  - OWASP Top 10 IoT Threats
  - OWASP IoT Attack Surface Areas
  - IoT Vulnerabilities
  - IoT Threats
  - Hacking IoT Devices: General Scenario
  - DDoS Attack
  - Exploit HVAC
  - Rolling Code Attack
  - BlueBorne Attack
  - Jamming Attack
  - Hacking Smart Grid/Industrial Devices: Remote Access using
  - Backdoor
  - SDR-Based Attacks on IoT
  - Identifying and accessing Local IoT Devices

- Fault Injection Attacks
- IoT Attacks in different sectors
- IoT Malware
- Case Study: IZ1H9

IoT Hacking Methodology

- What is IoT Device Hacking?
- IoT Hacking Methodology
  - Information Gathering
  - Information Gathering using Shodan
  - Information Gathering using MultiPing
  - Information Gathering using FCC ID Search
  - Information-Gathering Tools
  - Information Gathering through Sniffing
  - Sniffing using Cascoda Packet Sniffer
  - Sniffing Tools
  - Vulnerability Scanning
  - Vulnerability Scanning using IoTSeeker
  - Vulnerability Scanning using Genzai
  - Vulnerability Scanning using Nmap
  - Vulnerability-Scanning Tools
  - Analyzing Spectrum and IoT Traffic
  - Tools to Perform SDR-Based Attacks
- Launch Attacks
  - Rolling Code Attack using RFCrack
  - Hacking Zigbee Devices with Open Sniffer
  - BlueBorne Attack using HackRF One
  - Replay Attack using HackRF One
  - SDR-Based Attacks using RTL-SDR and GNU Radio

- Side-Channel Attack using ChipWhisperer
- Identifying IoT Communication Buses and Interfaces
- NAND Glitching
- Exploiting Cameras using CamOver

- Gain Remote Access
  - Gaining Remote Access using Telnet
  - Maintain Access
  - Maintain Access by Exploiting Firmware
  - Firmware Analysis and Reverse Engineering
- IoT Hacking Tools
- IoT Attack Countermeasures
  - How to defend against IoT Hacking
  - General Guidelines for IoT Device Manufacturers
  - OWASP Top 10 IoT Vulnerabilities Solutions
  - IoT Framework Security Considerations
  - IoT Hardware Security Best Practices
  - Secure Development Practices for IoT Applications
  - IoT Device Management
  - IoT Security Tools

OT Hacking

- OT Concepts and Attacks
  - What is OT?
  - Essential Terminology
  - Introduction to ICS (Industrial Control Systems)
  - Components of an ICS
  - IT/OT Convergence (IIOT)
  - The Purdue Model

- → OT Technologies and Protocols
- → Challenges of OT
- → OT Vulnerabilities
- → MITRE ATT&CK for ICS
- → OT Threats
- → HMI-Based Attacks
- → Side-Channel Attacks
- → Hacking Programmable Logic Controller (PLC)
- → Evil PLC Attack
- → Hacking Industrial Systems through RF Remote Controllers
- → OT Supply Chain Attacks
- → OT Malware
- → OT Malware Analysis: COSMICENERGY

✓ OT Hacking Methodology

- → What is OT Hacking?
- → OT Hacking Methodology
- → Information Gathering
  - Identifying ICS/SCADA Systems using Shodan
  - Gathering Default Passwords using CIRT.net
  - Information-Gathering Tools
  - Scanning ICS/SCADA Systems using Nmap
  - Sniffing using NetworkMiner
  - Analyzing Modbus/TCP Traffic using Wireshark
  - Discovering ICS/SCADA Network Protocols using Malcolm
  - Vulnerability Scanning
  - Vulnerability Scanning using Nessus
  - Vulnerability Scanning using Skybox
  - Sniffing and Vulnerability-Scanning Tools
  - Fuzzing ICS Protocols

- → Launch Attacks
  - Hacking ICS Hardware
  - Hacking Modbus Slaves using Metasploit
  - Hacking PLC using modbus-cli
- → Gain and Maintain Remote Access
  - Gaining Remote Access using DNP3
- → OT Hacking Tools

✓ OT Attack Countermeasures

- → How to defend against OT Hacking
- → OT Vulnerabilities and Solutions
- → How to secure an IT/OT Environment
- → Implementing a Zero-Trust Model for ICS/SCADA
- → International OT Security Organizations
- → OT Security Solutions
- → OT Security Tools

Module 19 Cloud Computing

Cloud Computing Concepts

- Introduction to Cloud Computing
- Types of Cloud Computing Services
- Shared Responsibilities in Cloud
- Cloud Deployment Models
- NIST Cloud Deployment Reference Architecture
- Cloud Storage Architecture
- Virtual Reality and Augmented Reality on Cloud
- Fog Computing
- Edge Computing
- Cloud vs. Fog Computing vs. Edge Computing
- Cloud Computing vs. Grid Computing
- Cloud Service Providers

Container Technology

- What is a Container?
  - → Containers Vs. Virtual Machines
- What is Docker?
  - → Microservices Vs. Docker
- Docker Networking
- Container Orchestration
- What is Kubernetes?
- Clusters and Containers
- Container Security Challenges
- Container Management Platforms
- Kubernetes Platforms

Serverless Computing

- What is Serverless Computing?
- Serverless Vs. Containers
- Serverless Computing Frameworks

Cloud Computing Threats

- OWASP Top 10 Cloud Security Risks
- OWASP Top 10 Kubernetes Risks
- OWASP Top 10 Serverless Security Risks
- Cloud Computing Threats
  - Data Security
  - Cloud Service Misuse
  - Interface and API Security
  - Operational Security
  - Infrastructure and System Configuration
  - Network Security
  - Governance and Legal Risks
  - Development and Resource Management
- Container Vulnerabilities
- Kubernetes Vulnerabilities
- Cloud Attacks
  - Service Hijacking using Social Engineering
  - Service Hijacking using Network Sniffing
  - Side-Channel Attacks or Cross-guest VM Breaches
  - Wrapping Attack
  - Man-in-the-Cloud (MITC) Attack
  - Cloud Hopper Attack
  - Cloud Cryptojacking
  - Cloudborne Attack

- Instance Metadata Service (IMDS) Attack
- Cache Poisoned Denial of Service (CPDoS)/Content Delivery
- Network (CDN) Cache Poisoning Attack
- Cloud Snooper Attack
- Golden SAML Attack
- Living Off the Cloud Attack (LotC)
- Other Cloud Attacks

- Cloud Malware

Cloud Hacking

- Cloud Hacking
- Cloud Hacking Methodology
  - Identifying Target Cloud Environment
  - Discovering Open Ports and Services using Masscan
  - Vulnerability Scanning using Prowler
  - Identifying Misconfigurations in Cloud Resources using CloudSploit
  - Cleanup and Maintaining Stealth

AWS Hacking

- Enumerating S3 Buckets
  - Enumerating S3 Buckets using SScanner
  - Enumerating S3 Bucket Permissions using BucketLoot
  - Enumerating S3 Buckets using CloudBrute
- Enumerating EC2 Instances
- Enumerating AWS RDS Instances
- Enumerating AWS Account IDs
- Enumerating IAM Roles
- Enumerating Weak IAM Policies using Cloudsplaining
- Enumerating AWS Cognito

- Enumerating DNS Records of AWS Accounts using Ghostbuster
- Enumerating Serverless Resources in AWS
- Discovering Attack Paths using Cartography
- Discovering Attack Paths using CloudFox
- Identify Security Groups Exposed to the Internet
- AWS Threat Emulation using Stratus Red Team
- Gathering Cloud Keys Through IMDS Attack
- Exploiting Misconfigured AWS S3 Buckets
- Compromising AWS IAM Credentials
- Hijacking Misconfigured IAM Roles using Pacu
- Scanning AWS Access Keys using DumpsterDiver
- Exploiting Docker Containers on AWS using Cloud Container Attack Tool (CCAT)
- Exploiting Shadow Admins in AWS
- Gaining Access by Exploiting SSRF Vulnerabilities
- Attacks on AWS Lambda
- AWS IAM Privilege Escalation Techniques
- Creating Backdoor Accounts in AWS
- Maintaining Access and Covering Tracks on AWS Cloud
- Environment by Manipulating the CloudTrail Service
- Establishing Persistence on EC2 Instances
- Lateral Movement: Moving Between AWS Accounts and Regions
- AWSGoat: A Damn Vulnerable AWS Infrastructure

Microsoft Azure Hacking

- Azure Reconnaissance using AADInternals
- Identifying Azure Services and Resources
- Enumerating Azure Active Directory (AD) Accounts
- Identifying Attack Surface using Stormspotter

- Collecting Data from AzureAD and AzureRM using AzureHound
- Accessing Publicly Exposed Blob Storage using Gobblin
- Identifying Open Network Security Groups (NSGs) in Azure
- Exploiting Managed Identities and Azure Functions
- Privilege Escalation using Misconfigured User Accounts in Azure AD
- Creating Persistent Backdoors in Azure AD using Service Principals
- Exploiting VNet Peering Connections
- AzureGoat – Vulnerable by Design Azure Infrastructure

Google Cloud Hacking

- Enumerating GCP Resources using Google Cloud CLI
  - → Enumerating GCP Organizations, Projects, and
  - → Cloud Storage Buckets
  - → Enumerating Google Cloud Service Accounts
  - → Enumerating Google Cloud Resources
  - → Enumerating Google Cloud IAM Roles and Policies
  - → Enumerating Google Cloud Services using gcp_service_enum
  - → Enumerating GCP Resources using GCP Scanner
  - → Enumerating Google Cloud Storage Buckets using gcloud_enum
- Enumerating Privilege Escalation Vulnerabilities using GCP Privilege Escalation Scanner
- Escalating Privileges of Google Storage Buckets using GCPBucketBrute
- Maintaining Access: Creating Backdoors with IAM Roles in GCP
- GCPGoat: Vulnerable by Design GCP Infrastructure

Container Hacking

- Information Gathering using kubectl
- Enumerating Registries
- Container/Kubernetes Vulnerability Scanning
- Exploiting Docker Remote API
- Hacking Container Volumes
- LXD/LXC Container Group Privilege Escalation
- Post Enumeration on Kubernetes etcd

Cloud Security

- Cloud Security Control Layers
- Cloud Security is the responsibility of both Cloud Provider and
- Consumer
- Cloud Computing Security Considerations
- Placement of Security Controls in the Cloud
- Assessing Cloud Security using Scout Suite
- Best Practices for Securing the Cloud
- Best Practices for Securing AWS Cloud
- Best Practices for Securing Microsoft Azure
- Best Practices for Securing Google Cloud Platform
- NIST Recommendations for Cloud Security
- Security Assertion Markup Language (SAML)
- Cloud Network Security
- Cloud Security Controls
- Kubernetes Vulnerabilities and Solutions
- Serverless Security Risks and Solutions
- Best Practices for Container Security
- Best Practices for Docker Security
- Best Practices for Kubernetes Security

- Best Practices for Serverless Security
- Zero Trust Networks
- Organization/Provider Cloud Security Compliance
- Checklist
- International Cloud Security Organizations
- Shadow Cloud Asset Discovery Tools
- Cloud Security Tools
- Container Security Tools
- Kubernetes Security Tools
- Serverless Application Security Solutions
- Cloud Access Security Broker (CASB)
- CASB Solutions
- Next-Generation Secure Web Gateway (NG SWG)

Module 20 Cryptography

Cryptography Concepts and Encryption Algorithms

- Cryptography
- Government Access to Keys (GAK)
- Ciphers
- Symmetric Encryption Algorithms
- Data Encryption Standard (DES)
- Triple Data Encryption Standard (DES)
- Advanced Encryption Standard (AES)
- RC4, RC5, and RC6 Algorithms
- Blowfish
- Twofish
- Threefish
- Serpent
- TEA
- CAST-128
- GOST Block Cipher
- Camellia
- Asymmetric Encryption Algorithms
- DSA and Related Signature Schemes
- Rivest Shamir Adleman (RSA)
- Diffie-Hellman
- Elliptic Curve Cryptography (ECC)
- YAK
- Message Digest (One-way Hash) Functions
- Message Digest Function: MD5 and MD6
- Message Digest Function: Secure Hashing Algorithm (SHA)

- RIPEMD-160
- HMAC
- CHAP
- EAP
- GOST – Hash Function
- Message Digest Functions Calculators
- Multi-layer Hashing Calculators
- Hardware-Based Encryption
- Quantum Cryptography
- Other Encryption Techniques
- Cipher Modes of Operation
- Modes of Authenticated Encryption
- Cryptography Tools

Applications of Cryptography

- Public Key Infrastructure (PKI)
- Certification Authorities
- Signed Certificate (CA) vs. Self-Signed Certificate
- Digital Signature
- Secure Sockets Layer (SSL)
- Transport Layer Security (TLS)
- Cryptography Toolkits
- Pretty Good Privacy (PGP)
- GNU Privacy Guard (GPG)
- Web of Trust (WOT)
- Encrypting Email Messages in Outlook
- Signing/Encrypting Email Messages on Mac
- Encrypting/Decrypting Email Messages Using OpenPGP
- Email Encryption Tools

- Disk Encryption
- Disk Encryption Tools for Linux/macOS
- Blockchain

Cryptanalysis

- Cryptanalysis Methods
- Cryptography Attacks
- Code-Breaking Methodologies
- Brute-Force Attack
- Birthday Attack
- Birthday Paradox: Probability
- Brute Forcing VeryCrypt Encryption
- Meet-in-the-Middle Attack on Digital Signature Schemes
- Side-Channel Attack
- Hash Collision Attack
- DUHK Attack
- DROWN Attack
- Rainbow Table Attack
- Related-Key Attack
- Padding Oracle Attack
- Attacks on Blockchain
- Quantum Computing Risks
- Quantum Computing Attacks
- Cryptanalysis Tools
- Online MD5 Decryption Tools

Cryptography Attack Countermeasures

- How to Defend Against Cryptographic Attacks
- Key Stretching

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