

Certified Professional Ethical Hacker

KEY DATA

Course Title: Certified Professional Ethical Hacker

Duration: 5 Days

Language: English

Class Format Options:

Instructor-led classroom
Live Online Training

Prerequisites:

- 12 months of IT security experience
- 12 months of Networking Experience

Student Materials:

- Student Workbook
- Student Lab guide
- Exam Prep Guide

CPEs: 40

WHO SHOULD ATTEND?

- Information System Owners
- Security Officers
- Ethical Hackers
- Information Owners
- Penetration Testers
- System Owner and Managers
- Cyber Security Engineers

COURSE BENEFITS

The **Certified Professional Ethical Hacker** vendor neutral certification course is the foundational training to mile2's line of penetration testing courses.

The **CPEH** certification training enables students to understand the importance of vulnerability assessments by providing industry knowledge and skills in Vulnerability Assessments. In doing so, the CPEH student is able to understand how malware and destructive viruses function. In addition, the CPEH course helps students learn how to implement counter response and preventative measures when it comes to a network hack.

The **CPEH** course provides in-depth labs that focus on both open source and commercial based tools with industry best practices. These hands on labs emulate real world hacking scenarios and equip the candidate to assess your company's security posture, help implement controls to better secure your company's network infrastructure and how to combat against hackers and/or viruses, etc.

Pen Testing Hacking Career



All Combos Include:

- Online Video
- Electronic Book (Workbook/Lab guide)
- Exam Prep Questions
- Exam
- Cyber Range Lab

ACCREDITATIONS



UPON COMPLETION

Upon completion, the **Certified Professional Ethical Hacker** candidate will be able to competently take the CPEH exam.

EXAM INFORMATION

The **Certified Professional Ethical Hacker** exam is taken online through Mile2's Assessment and Certification System ("MACS"), which is accessible on your mile2.com account. The exam will take 2 hours and consist of 100 multiple-choice questions. The cost is \$400 USD and must be purchased from Mile2.com.



OUTLINE

Module 1 - Security Fundamentals
Module 2 – Access Controls
Module 3 - Protocols
Module 4 -Cryptography
Module 5 - Why Vulnerability Assessments?
Module 6 - Vulnerability Tools of the Trade
Module 7 - Output Analysis and Reports
Module 8 - Reconnaissance, Enumeration & Scanning
Module 9 - Gaining Access
Module 10 - Maintaining Access

Module 11 - Covering Tracks
Module 12 - Malware
Module 13 - Buffer Overflows
Module 14 - Password Cracking

Appendix 1 - Economics and Law
Appendix 2 - Vulnerability Types
Appendix 3 - Assessing Web Servers
Appendix 4 - Assessing Remote & VPN Services
Appendix 5 - Denial of Services

DETAILED OUTLINE

Module 1 - Security Fundamentals

Overview

The Growth of
Environments and Security

Our Motivation...

The Goal: Protecting Information!

CIA Triad in Detail

Approach Security Holistically

Security Definitions

Definitions Relationships

Method: Ping

The TCP/IP Stack

Which Services Use Which Ports?

TCP 3-Way Handshake

TCP Flags

Malware

Types of Malware

Types of Malware Cont...

Types of Viruses

More Malware: Spyware

Trojan Horses

Back Doors

DoS

DDoS

Packet Sniffers

Passive Sniffing

Active Sniffing

Firewalls, IDS and IPS

Firewall – First

Line of Defense

IDS – Second Line of Defense

IPS – Last Line of Defense?

Firewalls

Firewall Types:

(1) Packet Filtering

Firewall Types:

(2) Proxy Firewalls

Firewall Types –

Circuit-Level Proxy Firewall

Type of Circuit-

Level Proxy – SOCKS

Firewall Types –

Application-Layer Proxy

Firewall Types: (3) Stateful

Firewall Types:

(4) Dynamic Packet-Filtering

Firewall Types:

(5) Kernel Proxies

Firewall Placement

Firewall Architecture

Types – Screened Host

Multi- or Dual-Homed

Screened Subnet

Wi-Fi Network Types

Wi-Fi Network Types

Widely Deployed Standards

Standards Comparison

802.11n - MIMO

Overview of Database Server

Review

Module 2 – Access Controls

Overview

Role of Access Control

Definitions

More Definitions

Categories of Access Controls

Physical Controls

Logical Controls

“Soft” Controls

Security Roles

Steps to Granting Access

Access Criteria

Physical Access

Control Mechanisms

Biometric System Types

Synchronous Token

Asynchronous Token Device

Memory Cards

Smart Card

Cryptographic Keys

Logical Access Controls

OS Access Controls
Linux Access Controls
Accounts and Groups
Password &
Shadow File Formats
Accounts and Groups
Linux and UNIX Permissions
Set UID Programs
Trust Relationships
Review

Module 3 - Protocols

Protocols Overview
OSI – Application Layer
OSI – Presentation Layer
OSI – Session Layer
Transport Layer
OSI – Network Layer
OSI – Data Link
OSI – Physical Layer
Protocols at
Each OSI Model Layer
TCP/IP Suite
Port and Protocol Relationship
Conceptual Use of Ports
UDP versus TCP
Protocols – ARP
Protocols – ICMP
Network Service – DNS
SSH Security Protocol
SSH
Protocols – SNMP
Protocols – SMTP
Packet Sniffers
Example Packet Sniffers
Review

Module 4 -Cryptography

Overview
Introduction
Encryption
Cryptographic Definitions
Encryption Algorithm
Implementation

Symmetric Encryption
Symmetric Downfalls
Symmetric Algorithms
Crack Times
Asymmetric Encryption
Public Key
Cryptography Advantages
Asymmetric
Algorithm Disadvantages
Asymmetric
Algorithm Examples
Key Exchange
Symmetric versus Asymmetric
Using the
Algorithm Types Together
Instructor Demonstration
Hashing
Common Hash Algorithms
Birthday Attack
Example of a Birthday Attack
Generic Hash Demo
Instructor Demonstration
Security Issues in Hashing
Hash Collisions
MD5 Collision Creates
Rogue Certificate Authority
Hybrid Encryption
Digital Signatures
SSL/TLS
SSL Connection Setup
SSL Hybrid Encryption
SSH
IPSec - Network Layer Protection
IPSec
IPSec
Public Key Infrastructure
Quantum Cryptography
Attack Vectors
Network Attacks
More Attacks (Cryptanalysis)
Review

Module 5 - Why Vulnerability Assessments

Overview
What is a
Vulnerability Assessment?
Vulnerability Assessment
Benefits of a
Vulnerability Assessment
What are Vulnerabilities?
Security Vulnerability Life Cycle
Compliance and Project Scoping
The Project
Overview Statement
Project Overview Statement
Assessing Current
Network Concerns
Vulnerabilities in Networks
More Concerns
Network Vulnerability
Assessment Methodology
Network Vulnerability
Assessment Methodology
Phase I: Data Collection
Phase II: Interviews, Information Reviews,
and Hands-On Investigation
Phase III: Analysis
Analysis cont.
Risk Management
Why Is Risk
Management Difficult?
Risk Analysis Objectives
Putting Together
the Team and Components
What Is the Value of an Asset?
Examples of Some Vulnerabilities that Are
Not Always Obvious
Categorizing Risks
Some Examples
of Types of Losses
Different Approaches
to Analysis
Who Uses What?
Qualitative Analysis Steps
Quantitative Analysis

ALE Values Uses
ALE Example
ARO Values and Their Meaning
ALE Calculation
Can a Purely Quantitative Analysis Be
Accomplished?
Comparing Cost and Benefit
Countermeasure Criteria
Calculating Cost/Benefit
Cost of a Countermeasure
Can You Get Rid of All Risk?
Management's Response to Identified Risks
Liability of Actions
Policy Review
(Top-Down) Methodology
Definitions
Policy Types
Policies with Different Goals
Industry Best
Practice Standards
Components that Support the Security Policy
Policy Contents
When Critiquing a Policy
Technical (Bottom-Up)
Methodology
Review

Module 6 - Vulnerability Tools of the Trade Overview

Vulnerability Scanners
Nessus
SAINT – Sample Report
Tool: Retina
Qualys Guard
<http://www.qualys.com/products/overview/>
Tool: LANguard
Microsoft Baseline Analyzer
MBSA Scan Report
Dealing with Assessment Results
Patch Management Options
Review

Module 7 - Output Analysis and Reports

Overview

Staying Abreast: Security Alerts

Vulnerability Research Sites

Nessus

SAINT

SAINT Reports

GFI Languard

GFI Reports

MBSA

MBSA Reports

Review

Module 8 - Reconnaissance, Enumeration and Scanning

Reconnaissance Overview

Step One in the

Hacking "Life-Cycle"

What Information is

Gathered by the Hacker?

Passive vs. Active Reconnaissance

Footprinting Defined

Social Access

Social Engineering Techniques

Social Networking Sites

People Search Engines

Internet Archive:

The WayBack Machine

Footprinting Tools Overview

Maltego GUI

Johnny.lhackstuff.com

Google (cont.)

Domain Name Registration

WHOIS Output

DNS Databases

Using Nslookup

Traceroute Operation

Web Server Info Tool: Netcraft

Introduction to Port Scanning

Which Services

use Which Ports?

Port Scan Tips

Port Scans Should Reveal...

Popular Port Scanning Tools

Ping (Is the host online?)

Stealth Online Ping

TCP 3-Way Handshake

TCP Flags

TCP Connect Port Scan

Half-open Scan (SynScan)

Firewalled Ports

NMAP TCP Connect Scan

Enumeration Overview

Web Server Banners

HTTPrint

DNS Enumeration

SNMP Insecurity

SNMP Enumeration Tools

SNMP Enumeration Countermeasures

Active Directory Enumeration

LDAPMiner

AD Enumeration Countermeasures

Null Sessions

Viewing Shares

Tool: DumpSec

Tool: Enumeration

with Cain and Abel

Null Session

Countermeasures (cont.)

Review

Module 9 - Gaining Access

Overview

How Do Exploits Work?

Physical Access Attacks

Lock Picking

Tool Kit: Torque Wrench

Tool Kit: Picks

Tool Kit: Snap Gun

Tool Kit: Electric Pick

Internal Mechanism

Pin Tumblers

Pin Tumblers

Picking

Binding Pin

Binding

Binding

Binding Order

Raking
Raking
Bumping
Bump Keying
Shimming Door Locks
Padlocks
Bypassing
Padlock Shims
Shock Energy
Lock Picking Countermeasures
The Metasploit Project
Defense in Depth
Instructor Demonstration
SaintExploit at a Glance
SaintExploit Interface
Core Impact Overview
Core Impact
Review

Module 10 - Maintaining Access

Overview
Back Doors
Backdoor via Rootkits
Linux Backdoor via Rootkits
Linux Backdoor via Rootkits
Windows RootKit Countermeasures
Tool: Netcat
Netcat Switches
Netcat as a Listener
Meterpreter
Review

Module 11 - Covering Tracks

Overview
Covering Tracks Overview
Disabling Auditing
Clearing and Event Log
Hiding Files with
NTFS Alternate Data Stream
NTFS Streams
Countermeasures
Stream Explorer
What is Steganography?
Steganography Tools

Shedding Files Left Behind
Leaving No Local Trace
More Anonymous Software
StealthSurfer II Privacy Stick
Tor: Anonymous Internet Access
Encrypted Tunnel Notes
Review

Module 12 - Malware

Overview
Distributing Malware
Malware Capabilities
Countermeasure: Monitoring Autostart
Methods
Tool: Netcat
Netcat Switches
Netcat as a Listener
Executable Wrappers
Benign EXE's Historically Wrapped with
Trojans
Tool: Restorator
Tool: Exe Icon
The Infectious CD-Rom Technique
Trojan: Backdoor.Zombam.B
Trojan: JPEG GDI+ All in One Remote
Exploit
Advanced Trojans: Avoiding Detection
BPMTK
Malware Countermeasures
Gargoyle Investigator
Spy Sweeper Enterprise
CM Tool: Port Monitoring Software
CM Tools: File Protection Software
CM Tool: Windows File Protection
CM Tool: Windows Software Restriction
Policies
CM Tool: Hardware Malware Detectors
Countermeasure: User Education
Review

Module 13 - Buffer Overflows

Overview
Buffer Overflow Definition
Overflow Illustration

Buffer Overflows
Memory Organization
How Buffers and Stacks
Are Supposed to Work
Stack Function
How a Buffer Overflow Works
Buffer Overflows
Secure Code Review
Prevention
Review

Module 14 - Password Cracking

Overview
Attack Vectors
Unix Passwords and Encryption
Password Cracking Tools
NAT Dictionary Attack Tool
THC-Hydra
Password Guessing
Password Cracking
LM/NTLM Hashes
LM Hash Encryption
NT Hash Generation
Windows Syskey Encryption
Creating Rainbow Tables
Free Rainbow Tables
NTPASSWD:Hash Insertion Attack
Password Sniffing
Sniffing Remote Passwords
Tool: Cain and Abel
Review

Appendix 1 - Economics and Law

Overview
Attack Vectors
Unix Passwords and Encryption
Password Cracking Tools
NAT Dictionary Attack Tool
THC-Hydra
Password Guessing
Password Cracking
LM/NTLM Hashes
LM Hash Encryption
NT Hash Generation

Windows Syskey Encryption
Creating Rainbow Tables
Free Rainbow Tables
NTPASSWD:Hash Insertion Attack
Password Sniffing
Sniffing Remote Passwords
Tool: Cain and Abel
Review

Appendix 2 - Vulnerability Types

Overview
Critical Vulnerabilities
Critical Vulnerability Types
Buffer Overflows
URL Mappings
to Web Applications
IIS Directory Traversal
Format String Attacks
Default Passwords
Misconfigurations
Known Backdoors
Information Leaks
Memory Disclosure
Network Information
Version Information
Path Disclosure
User Enumeration
Denial of Service
Best Practices
Review
Lab

Appendix 3 - Assessing Web Servers

Web Servers
Fingerprinting
Accessible Web Servers
Identifying and Assessing
Reverse Proxy Mechanisms
Proxy Mechanisms
Identifying Subsystems
and Enabled Components
Basic Web Server Crawling
Web Application
Technologies Overview

Web Application Profiling
HTML Sifting and Analysis
Active Backend
Database Technology Assessment
Why SQL "Injection"?
Web Application
Attack Strategies
Web Application Vulnerabilities
Authentication Issues
Parameter Modification
SQL Injection: Enumeration
SQL Extended Stored Procedures
Shutting Down SQL Server
Direct Attacks
SQL Connection Properties
Attacking Database Servers
Obtaining Sensitive Information
URL Mappings
to Web Applications
Query String
Changing URL Login Parameters
URL Login Parameters Cont.
IIS Directory Traversal
Cross-Site Scripting (XSS)
Web Security Checklist
Review

Appendix 4 - Assessing Remote & VPN Services

Assessing Remote & VPN Services
Remote Information Services
Retrieving DNS
Service Version Information
DNS Zone Transfers
Forward DNS Grinding
Finger
Auth
NTP
SNMP
Default Community Strings
LDAP
rwho
RPC rusers
Remote Maintenance Services

FTP
SSH
Telnet
X Windows
Citrix
Microsoft Remote
Desktop Protocol
VNC
Assessing IP VPN Services
Microsoft PPTP
SSL VPNs
Review

Appendix 5 - Denial of Service

Overview
DDoS Issues
DDoS
Zombie Definition
DDoS Attack Types
Wifi Denial of Service (DoS)
Evading The Firewall and IDS
Evasive Techniques
Firewall – Normal Operation
Evasive Technique -Example
Evading With Encrypted Tunnels
Man-in-the-middle Attacks
ARP Cache Poisoning
ARP Normal Operation
ARP Cache Poisoning
ARP Cache Poisoning (Linux)
Tool: Cain and Abel
Ettercap
Countermeasures
What is DNS spoofing?
Tools: DNS Spoofing
Breaking SSL Traffic
Tool: Breaking SSL Traffic
Tool: Cain and Abel
Voice over IP (VoIP)
Intercepting VoIP
Session Hijacking
Review

DETAILED LAB OUTLINE



Lab 1 Introduction

Lab Setup

Student Materials

Reporting

Lab 2 Linux Fundamentals

Command Line Tips & Tricks

Linux Networking for Hackers

Files

Lab 3 Information Gathering

Passive Reconnaissance

Google Queries

Active Reconnaissance

Collection and Analysis with

MaltegoLook@LAN

Zenmap

Hping3

Lab 4 Enumeration

Banner Grabbing

Null Sessions

NetBIOS Enumeration

SMTP Enumeration

Lab 5 Finding Vulnerabilities

Nessus Vulnerability Scanner

SAINT Vulnerability Scanner

Lab 6 Network Attacks

Netcat

Capture FTP Traffic

ARP Cache Poisoning

Lab 7 Windows Hacking

Using Metasploit

Windows 2008 SMBv2 Exploit

Cracking with John the Ripper

Lab 8 Linux Hacking

NFS

Cracking a Linux password

Backdoors

Lab 9 Advanced Vulnerability and Exploitation Techniques

Armitage

Saint

Lab 10 Hacking Web Applications and Databases

Brute-Force Web Authentication with Hydra

Brute-Force PostgreSQL with Hydra

Lab 11 Appendix

Input Manipulation

Exercise2 – Shoveling a Shell