Diploma in Cyber Security & Ethical Hacking 2021 Program: -

FIRST SEMESTER

- C Programming Language
- Python Programming 3.9
- Linux RHCSA RHCE & Kali Linux
- CCNA 200-301 Cisco Certified Network Associate
- CEHv11 Certified Ethical Hacking Version 11
- ECSAv10 EC Council Certified Security Analyst V10

SECOND SEMESTER

- Network Security & Network Penetration Testing
- Web Security & Web Application Penetration Testing
- Computer Forensic & Computer Investigation CHFIv9
- Cloud Security & Cloud Penetration Testing
- IOT Security & IOT Penetration Testing
- Server Security & Server Penetration Testing
- Machine Learning Security & Penetration Testing

C Programming Language

Fundamental of C Language:-

- About C tutorial
- Important points about C
- Why Use C
- Applications of C
- C Language and English Language
- Features of C
- C, C++ and Java

Overview of C Language: -

- History of C
- First Program in C Hello World
- Basic Structure of C Programming
- Tokens in C
- Keywords in C
- Identifiers in C
- Format Specifiers
- Format Specifiers Examples

Data Types in C Language: -

- Introduction to Data Types in C
- int Data Type in C
- float Data Type in C
- double Data Type in C
- char Data Type in C

Variable in C Language: -

- Variable Introduction in C
- Variable Declaration and Initialization
- Variable types and Scope in C
- Local Variable in C
- static Variable in C
- Global variables in C
- Storage Class in C
- Constants in C

Operators and Enums in C Language: -

- Introduction to Operator
- Arithmetic Operators in C
- Relational Operators in C
- Bit-wise Operators in C
- Logical Operators in C
- Assignment Operators in C

- **Conditional Operator in C**
- **sizeof() Operator in C**
- **Operator Precedance**

Decision Making of C Language: -

- **Decision Making in C Introduction**
- **if Statement**
- **if-else Statement**
- **Nested if Statement**
- **if else if Ladder**
- **switch case**
- **Loop Introduction in C**
- **while loop in C**
- **do while Loop In C**
- **for Loop in C**
- **break Statement in C**
- **continue Statement in C**
- **goto Statement in C**
- **Single Dimensional Array**
- **Multi-Dimensional Array in C**
- **Introduction to String**
- **Function in C**
- **Function Calling in C**
- **return type in Function**
- **Call by Value in C**
- **User Define Function**
- **Predefined Functions**

String Functions in C: -

- **All String Functions**
- **strcat() function**
- **strncat() function**
- **strcpy() function**
- **strncpy() function**
- **strlen() function**
- **strcmp() function**
- **strcmpi() function**
- **strchr() function**
- **strrchr() function**
- **strstr() function**
- **strrstr() function**
- **strdup() function**
- **strlwr() function**
- **strupr() function**
- **strrev() function**
- **strset() function**
- **strnset() function**
- **strtok() function**

Recursion in C: -

- **Introduction to Recursion**
- **Direct and Indirect Recursion**

Pointer in C Language: -

- **Pointer in C**
- **types of pointer**
- **NULL pointer**
- **Dangling Pointer**
- **Void/Generic Pointers**
- **Wild Pointer**
- **Near, Far and Huge Pointer**
- **Pointer Expressions and Arithmetic**
- **Pointer and Array**
- **Strings as pointers**
- **Pointer to Function**
- **Call by Reference in C**

Structure in C Language: -

- **Structure in C**
- **Nested Structure in C**
- **Array of Structures in C**
- **Pointer to Structure**
- **Structure to Function in C**
- **typedef in C**
- **typedef vs #define in C**
- **Union in C**

File Input / Output: -

- **Introduction to File**
- **File Operation in c**

Python Programming 3.9

Open Source Tools

- **Anaconda**
- **Spyder**
- **Jupyter Notebook**
- **Create and Share Jupyter Notebook**

Python Basics

- **Expressions and Variables**
- **String Operations**
- **Indexing**
- **Slicing**

Python Data Structure

- **a. List and Tuples**
  - o **i. Nested or Multi-Dimensional List**
  - o **ii. List Comprehension**

- **b. Dictionaries**
- **c. Sets**

Python Programming Fundamentals

- **a. Conditions and Branching**
- **b. Loops**
- **c. User Define Functions**
- **d. Computing Sum, Max, Min, Mean of a list**
- **e. Special Variables in Python**
  - o **i. Understanding _ , __ , and __xyz__ in Python**
  - o **ii. __init__**
  - o **iii. __name__**
  - o **v. __self__ etc.**

- **f. Code Reusability**
- **i. Creating and Importing Modules**

Functional Programming in Python

- **a. Map, Zip, Reduce, Filter, and Lambda Functions in Python**
- **b. Working with Standard Python Modules**
  - o **i. Itertools**
  - o **ii. Functools**
  - o **iii. <u>Operator</u>**

Object Oriented Programming

- **a. Objects and Classes**
- **b. Regular, Static, Special, and Class Methods**
- **c. Inheritance, Polymorphism, and Abstraction in Python**

Working with Data Storage System in Python

- **a. Reading and Writing Text Files**
- **b. Reading and Writing CSV Files**
- **c. Working with SQL Database in Python**
  - o **i. Connecting with SQL Database**
  - o **ii. Creating Table**

- o **iii. Reading, Writing, and Updating Tables**

Working with Directory and File Management

- **a. Working with os, sys and shutil Module**
- **b. Creating, Renaming, and Listing All Directories**
- **c. Manage Large Files**

Working with Date and Time in Python

- **a. Fundamentals of datetime module**
- **b. Working with Date and Time**
- **c. Calculating difference between two dates/times**
- **d. Converting timestamp into date and time**

Linux & Kali Linux

Linux basic concepts & installations

- **Installation in Standalone Machine**
- **Installation through NFS**
- **Installation through FTP**
- **Installation through HTTP**
- **Installation through KICKSTART**

File System Management :

- **Creation of File Systems**
- **Understanding EXT2, EXT3& EXT4 File Systems**
- **Converting Ext2 to Ext3 file systems**
- **Reverting back from Ext3 to Ext2 files systems**
- **Understanding fdisk,e2label, mount, umount commands**
- **Understanding fstab and mtab files**
- **TROUBLESHOOTING**

User management :

- **Understanding different types of groups and creation of groups**
- **Creation of users in different groups**
- **Understanding Passwd, Shadow Files**
- **Understanding passwd aging**
- **Creation of quotas for users, groups and file systems**
- **Understanding users security files**
- **The different commands for Monitoring the users**
- **TROUBLESHOOTING**

Run levels :

- **Understanding the different types of run-levels**
- **Understanding different types of shutdown commands**
- **Understanding run control scripts**
- **Understanding the different types**

Network file system (NFS) :

- **Understanding NFS server and NFS clients**
- **Understanding daemons and files in NFS of boot phases**
- **Configuring NFS server and different NFS clients**
- **Configuration of autofs, NFS security**

File transfer protocol :

- **Understanding the features and advantages of FTP server**
- **Configuring FTP server and FTP clients**
- **Configuring FTP server for anonymous and real users with download and upload permissions**
- **Configuring FTP user access, FTP security**
- **Understanding FTP Basic Commands**
- **Configuring of anonymous FTP Server**

XINETD :

- **Understanding xinetd based and non xinetd based services**
- **Configuring xinetd based services**
- **Xinetd security**

TCP WRAPPER :

- **Understanding TCP WRAPPER**
- **Configuring TCP WRAPPER for services**

Domain naming service :

- **Understanding DNS service and different types of DNS servers**
- **Configuring DNS (master) DNS (Slave)**
- **Understanding & Configuring forward (DNS) and cache (DNS) of boot phases**
- **Understanding different types of files when the system is booting**
- **TROUBLESHOOTING**

Logical volume manager (LVM) :

- **Creation of file systems and converting into LVM**
- **Creation of physical partitions**
- **Creation of volume groups**
- **Creation of logical partitions**
- **Extending the volume group**
- **Extending the logical partitions**

Package Manager (RPM) :

- **Understanding the features and advantages of RPM**
- **Installation of RPM packages**
- **Upgradation of RPM**
- **Verification of RPM**
- **Q u e r y i n g , T R O U B L E SHOOTING**

Backup and recovery :

- **Understanding different types of file system backup**
- **Understanding different types of files backups**
- **Understanding different types of file system backups**
- **Understanding different types of dump levels**
- **Understanding monthly, weekly, daily backups**
- **Different types of backup strategies**

Automation of jobs :

- **At Jobs . Cron Jobs**

Network information service:

- **Understanding NIS and daemons at NIS (Server, Slave and Clients)**
- **Configuring NIS (master), NIS (slave) and NIS clients in heterogeneous environments**
- **Integrating NIS (master and slave) with NFS Server**

Dynamic host configuration protocol :

- **Understanding DHCP**
- **Configuring DHCP server for different DHCP clients**

APACHE :

- **Understanding APACHE**
- **Configuring APACHE web server with virtual hosting**
- **Configuring APACHE web server with IP BASED, HOST BASED and PORT BASED**
- **Configuring member logins for APACHE web server**

SAMBA :

- **Understanding the features and advantages of SAMBA server**
- **Configuring SAMBA for heterogeneous environment**
- **Sharing the resources between unix to unix using SAMBA**
- **Sharing the resources between windows to unix (vice-versa)**
- **SAMBA security**

SQUID :

- **Understanding SQUID proxy**
- **Configuring SQUID proxy with ACL**

Raid levels :

- **Understanding RAID LEVELS**
- **Configuring different types of RAID LEVELS (0,1and5)**

CCNA 200-301 Syllabus or Outline

Describe how a network works: -

- **Describe the purpose and functions of various network devices**
- **Describe the purpose and functions of various network devices**
- **Select the components required to meet a network specification**
- **Use the OSI and TCP/IP models and their associated protocols to explain how data flows in a network**
- **Describe common networked applications including web applications**
- **Describe the purpose and basic operation of the protocols in the OSI and TCP models**
- **Describe the impact of applications (Voice Over IP and Video Over IP) on a network**
- **Interpret network diagrams**
- **Determine the path between two hosts across a network**
- **Describe the components required for network and Internet communications**
- **Identify and correct common network problems at layers 1, 2, 3 and 7 using a layered model approach**
- **Differentiate between LAN/WAN operation and features**

Configure, verify and troubleshoot a switch with VLANs and interswitch communications: -

- **Select the appropriate media, cables, ports, and connectors to connect switches to other network devices and hosts**
- **Explain the technology and media access control method for Ethernet networks**
- **Explain network segmentation and basic traffic management concepts**
- **Explain basic switching concepts and the operation of Cisco switches**
- **Perform and verify initial switch configuration tasks including remote access management**
- **Verify network status and switch operation using basic utilities (including: ping, traceroute, telnet, SSH, arp, ipconfig), SHOW & DEBUG commands**
- **Identify, prescribe, and resolve common switched network media issues, configuration issues, auto negotiation, and switch hardware failures**

- Describe enhanced switching technologies (including: VTP, RSTP, VLAN, PVSTP, 802.1q)
- Describe how VLANs create logically separate networks and the need for routing between them
- Configure, verify, and troubleshoot VLANs
- Configure, verify, and troubleshoot trunking on Cisco switches
- Configure, verify, and troubleshoot interVLAN routing
- Configure, verify, and troubleshoot VTP
- Configure, verify, and troubleshoot RSTP operation
- Interpret the output of various show and debug commands to verify the operational status of a Cisco switched network.
- Implement basic switch security (including: port security, trunk access, management vlan other than vlan1, etc.)

Implement an IP addressing scheme and IP Services to meet network requirements: -

- Describe the operation and benefits of using private and public IP addressing
- Explain the operation and benefits of using DHCP and DNS
- Configure, verify and troubleshoot DHCP and DNS operation on a router.(including: CLI/SDM)
- Implement static and dynamic addressing services for hosts in a LAN environment
- Calculate and apply an addressing scheme including VLSM IP addressing design to a network
- Determine the appropriate classless addressing scheme using VLSM and summarization to satisfy addressing requirements in a LAN/WAN environment
- Describe the technological requirements for running IPv6 in conjunction with IPv4 (including: protocols, dual stack, tunneling, etc).
- Describe IPv6 addresses
- Identify and correct common problems associated with IP addressing and host configurations

Configure, verify and troubleshoot a switch with VLANs and interswitch communications: -

- Describe basic routing concepts (including: packet forwarding, router lookup process)
- Describe the operation of Cisco routers (including: router bootup process, POST, router components)
- Select the appropriate media, cables, ports, and connectors to connect routers to other network devices and hosts
- Configure, verify, and troubleshoot RIPv2
- Access and utilize the router to set basic parameters.(including: CLI/SDM)
- Connect, configure, and verify operation status of a device interface
- Verify device configuration and network connectivity using ping, traceroute, telnet, SSH or other utilities

- **Perform and verify routing configuration tasks for a static or default route given specific routing requirements**
- **Manage IOS configuration files. (including: save, edit, upgrade, restore)**
- **Manage Cisco IOS**
- **Compare and contrast methods of routing and routing protocols**
- **Configure, verify, and troubleshoot OSPF**
- **Configure, verify, and troubleshoot EIGRP**
- **Verify network connectivity (including: using ping, traceroute, and telnet or SSH)**
- **Troubleshoot routing issues**
- **Verify router hardware and software operation using SHOW & DEBUG commands.**
- **Implement basic router security**

Explain and select the appropriate administrative tasks required for a WLAN

- **Describe standards associated with wireless media (including: IEEE WI-FI Alliance, ITU/FCC)**
- **Identify and describe the purpose of the components in a small wireless network. (Including: SSID, BSS, ESS)**
- **Identify the basic parameters to configure on a wireless network to ensure that devices connect to the correct access point**
- **Compare and contrast wireless security features and capabilities of WPA security (including: open, WEP, WPA-1/2)**
- **Identify common issues with implementing wireless networks. (Including: Interface, miss configuration)**

Identify security threats to a network and describe general methods to mitigate those threats: -

- **Describe today's increasing network security threats and explain the need to implement a comprehensive security policy to mitigate the threats**
- **Explain general methods to mitigate common security threats to network devices, hosts, and applications**
- **Describe the functions of common security appliances and applications**
- **Describe security recommended practices including initial steps to secure network devices**

Implement, verify, and troubleshoot NAT and ACLs in a medium-size Enterprise branch office network: -

- **Describe the purpose and types of ACLs**
- **Configure and apply ACLs based on network filtering requirements.(including: CLI/SDM)**
- **Configure and apply an ACLs to limit telnet and SSH access to the router using (including: SDM/CLI)**
- **Verify and monitor ACLs in a network environment**
- **Troubleshoot ACL issues**
- **Explain the basic operation of NAT**

- **Configure NAT for given network requirements using (including: CLI/SDM)**
- **Troubleshoot NAT issues**

Implement and verify WAN links: -

- **Describe different methods for connecting to a WAN**
- **Configure and verify a basic WAN serial connection**
- **Configure and verify Frame Relay on Cisco routers**
- **Troubleshoot WAN implementation issues**
- **Describe VPN technology (including: importance, benefits, role, impact, components)**
- **Configure and verify a PPP connection between Cisco routers**

CEHv11 Certified Ethical Hacker Version 11: -

Ethical Hacking Syllabus: -

- **Information Intelligence.**
- **Information Intelligence**
- **Organize Your Information**
- **Google/Bing Hacking.**
- **Hunting And Profiling People.**
- **Gathering Email Accounts Sub domains/host.**
- **Whois Lookup**
- **OS Info Hunting**
- **Uptime Info Hunting**
- **Webserver Info Hunting**
- **Traceroute Target IP Address**
- **TCP Port Scanning**
- **TCP SYN Port Scanning**
- **TCP ACK Firewall Scanning**
- **Finding Live Hosts**
- **UDP Sweeping And Probing**
- **Database Enumerating**
- **MySQL Server Enumerating**
- **DNS Enumerating**
- **SNMP Enumerating**
- **Password Attacks**
- **Advanced Web Server Fingerprinting**
- **Advanced Web Application Fingerprinting**
- **Advanced Web Application Firewall Fingerprinting**
- **Advanced OS Fingerprinting**
- **Attacking DHCP Servers**
- **Writing Virus Codes**
- **Writing Advance Backdoors for Windows**
- **Attacking Network Switches**
- **Attacking FTP Servers**
- **Advanced Social Engineering Attacks**
- **Advanced Cross Site Scripting attacks**

- **From Reflected XSS To Reverse Shell**
- **From Stored XSS To Reverse Shell**
- **Advanced File Handling Attacks**
- **From File Upload To Reverse Shell**
- **From Remote File Inclusion To Reverse Shell**
- **From Local File Inclusion To Reverse Shell.**
- **From SQL Injection To Reverse Shell**
- **Advanced CSRF Attacks**
- **Session Hijacking Attacks**
- **Advanced System Command Injection Attack**
- **Sniffing Network Passwords**
- **Sniffing HTTP Passwords**
- **Sniffing Ftp And Telnet Passwords**
- **Advanced Sniffing**
- **Sniffing Facebook Cookies**
- **Advanced SSL Sniffing**
- **Advanced Network Attacks**
- **From Man In The Middle Attack To Full Network**
- **Advanced Mobile Hacking Tactics**
- **Attacking WEP Protected 802.11 Networks**
- **Attacking WPA/WPA2 Protected 802.11 Networks**
- **Attacking Apache Web Server**
- **Attacking IIS Web Server**
- **Buffer Overflow Attacks**
- **Advanced Stateful Packet Inspection Firewall Evasion And Bypassing**
- **Advanced Antivirus Detection Evasion And Bypassing**
- **Advanced Windows User Access Control (UAC) Evasion And Bypassing**
- **Advanced Firewall Outbound/Inbound Rules Evasion And Bypassing**
- **Vulnerability Vs Penteration Testing**

ECSAv10 EC Council Certified Security Analyst Syllabus: -

1. # Introduction to penetration testing and methodologies
2. # penetration testing scoping and engagement methodology
3. # open source intelligence (OSINT) Methodology
4. # Social Engineering penetration testing methodology
5. # Network Penetration testing methodology-external
6. # Network Penetration testing methodology-internal
7. # Network Penetration testing methodology-perimeter devices
8. # web application penetration testing methodology
9. # database penetration testing methodology
10. # wireless penetration testing methodology
11. # cloud penetration testing methodology
12. # Report writing and post Testing Actions
13. # Penetration testing essential concepts
14. # password cracking penetration testing
15. # Denial-of-service penetration testing
16. # stolen laptop PDAs and cell phones penetration testing
17. # source code penetration testing
18. # physical security penetration testing
19. # surveillance camera penetration testing

20. # Voip penetration testing
21. # vpn penetration testing
22. # virtual machine penetration testing
23. # war dialling
24. # virus and Trojan detection
25. # log management penetration testing
26. # file integrity checking
27. # telecommunication and broadband communication penetration testing
28. # email security penetration testing
29. # security patches penetration testing
30. # data leakage penetration testing
31. # SAP Penetration Testing
32. # Standards and compliance
33. # information system security principles
34. # information system incident handling and response
35. # information system auditing and certification

Network Security & Network Penetration Testing: -

- Pentesting Routers
- Attacking SSH with Metasploit, Nmap, Medusa, Hydra, Ncrack
- SNMP attacks
- Bypassing Firewalls
- Payloads and Shells
- HTTP/HTTPS tunneling
- Port Forwaring, Pivoting, Reverse Connects
- Privilege Escalation and UAC bypass
- Hash Dumping and Mimikatz
- Windows Sessions, Stations and Desktops
- Impersonation attacks
- WMIC post exploitation
- Hidden bind shells
- Bitsadmin
- Browser Password Recovery
- PAC Attacks
- DNS Poisoning
- Veil Framework and AV Evasion
- Metasploit Loader 32/64-bit
- DLL Hijacking basics
- DLL Hijacking and Meterpreter
- Privilege Escalation via DLL Hijacking
- DLL Injection using Appinit_DLLs
- Stripping Manifest Files for DLL Hijacking
- Attacking with DLL Forwarding
- Anti-Forensics techniques
- Memory Dumping and Analysis

Web Security & Web Application Penetration Testing: -

You Will Learn:

- **To apply a repeatable methodology to deliver high-value penetration tests.**
- **How to discover and exploit key web application flaws.**
- **How to explain the potential impact of web application vulnerabilities.**
- **The importance of web application security to an overall security posture.**
- **How to wield key web application attack tools more efficiently.**
- **How to write web application penetration test reports.**

You Will Be Able To

- **Apply OWASP's methodology to your web application penetration tests to ensure they are consistent, reproducible, rigorous, and under quality control.**
- **Analyze the results from automated web testing tools to validate findings, determine their business impact, and eliminate false positives.**
- **Manually discover key web application flaws.**
- **Use Python to create testing and exploitation scripts during a penetration test.**
- **Discover and exploit SQL Injection flaws to determine true risk to the victim organization.**
- **Understand and exploit insecure deserialization vulnerabilities with ysoserial and similar tools.**
- **Create configurations and test payloads within other web attacks.**
- **Fuzz potential inputs for injection attacks.**
- **Explain the impact of exploitation of web application flaws.**
- **Analyze traffic between the client and the server application using tools such as the Zed Attack Proxy and BurpSuite Pro to find security issues within the client-side application code.**
- **Manually discover and exploit Cross-Site Request Forgery (CSRF) attacks.**
- **Use the Browser Exploitation Framework (BeEF) to hook victim browsers, attack client software and the network, and evaluate the potential impact that XSS flaws have within an application.**
- **Perform two complete web penetration tests, one during the five days of course instruction, and the other during the Capture the Flag exercise.**

Course Topics

- **Interception Proxies**
  - **ZAP (Zed Attack Proxy)**
  - **BurpSuite Professional**

- **Common Vulnerabilities**
  - **SSL/TLS misconfigurations**
  - **Username harvesting**
  - **Command Injection**

- SQL Injection
  - Cross-Site Scripting (XSS)
  - Insecure Deserialization
  - XML External Entities (XXE)
  - Local and Remote File Inclusion (LFI / RFI)
  - Cross-Site Request Forgery (CSRF)
- **Open Source Intelligence (OSINT)**
- **Target Profiling**
- **Application Discovery**
- **Authentication and Authorization**
- **Session Management Flaws**
- **Automated Exploitation**

Hands-On Training

SANS SEC542 employs hands-on labs throughout the course to further students' understanding of web application penetration concepts. Some of the many hands-on labs in the course include:

- **DNS Harvesting and Virtual Host Discovery**
- **Authentication Bypass**
- **Heartbleed Exploitation**
- **Insecure Deserialization**
- **Reflected and Persistent XSS Attacks**
- **DOM-Based XSS Attacks**
- **Spidering and Forced Browsing**
- **WPScan**
- **SQL Injection**
- **Blind SQL Injection**
- **CSRF Exploitation**
- **XML External Entities**
- **Metasploit for Web Application Attacks**
- **Exploiting Shellshock**
- **Leveraging the sqlmap tool**
- **BeEF and Browser Exploitation**
- **Username Harvesting**
- **Password Guessing Attacks**
- **HTML Injection**
- **Remote File Inclusion**
- **Local File Inclusion**

- **OS Command Injection**
- **Drupalgeddon and Drupalgeddon 2 Exploitation**
- **BurpSuite Professional Scanner**
- **Python for Web Application Pen Testers**
- **Troubleshooting when automated tools fail**
- **Extensive use of both BurpSuite Pro and ZAP throughout the course**

AWS Course Syllabus & Penetration Testing

Linux Fundamentals
Installation and Initialization:

- **Installation, Package Selection**
- **Anatomy of a Kickstart File, Command line**
- **Introduction to Bash Shell**
- **System Initialization, Starting the Boot Process: GRUB**

Boot and Package Management:

- **Configuring services to run at boot**
- **Securing single-user mode (SU login)**
- **Shutting down and rebooting the system**
- **RPM Package Manager, Installing and Removing Software, Updating a Kernel RPM**
- **Yum Command set, Install packages by using yum**
- **Apt-get command set, Apt-cache package management**

User Administration:

- **Understanding different types of groups and creation of groups**
- **Creation of users in different groups**
- **Understanding Passwd, Shadow Files**
- **Understanding password aging**
- **Creation of quotas for users, groups and file systems**
- **Understanding users security files**
- **The different commands for Monitoring the users**
- **TROUBLESHOOTING**
- **Automation of jobs – Cron, at**

Run levels:

- **Understanding the different types of run-levels**
- **Understanding different types of shutdown commands**
- **Understanding run control scripts**
- **Understanding the different types**

Overview of the Service Protocols:

- **FTP**
- **DHCP**
- **DNS**
- **Apache**
- **Samba**
- **LVM**

AWS Sysops Administrator Certification

Cloud Computing

- **Introduction to Cloud Computing**
- **Why Cloud Computing?**
- **Benefits of Cloud Computing**
- **Types of Cloud Computing**
- **Public Cloud**
- **Private Cloud**
- **Hybrid Cloud**
- **Community Cloud**
- **Software as a Service**
- **Platform as a Service**
- **Horizontal vs vertical scaling**
- **Cloud Computing Issues**
- **Security**
- **Costing Model**

What is virtualization?

- **Virtualization and cloud computing**
- **Types of virtualization**
- **Virtualization terminologies**
- **Hypervisor**
- **Benefits**
- **Vendors**

AWS Platform

- **Introduction to AWS Elastic computing**
- **Introduction to the AWS products**
- **Regions and Availability Zones**
- **Signing up for AWS**
- **AWS Free usage tier**
- **Introduction AWS management console**

EC2 Instance

- **Understanding AMI**

- **Launching your first AWS instance**
- **On-demand Instance pricing**
- **Reserved Instance pricing**
- **Spot instance pricing**
- **Setting up security**
- **Security groups**
- **Choosing & Creating a new AMI**
- **Public and Private IP's**
- **Deploying a new instance from the created AMI**
- **Key Pairs**
- **Elastic IP's**

Load Balancing

- **Introduction to Scaling**
- **ELB(Elastic Load Balancer)**
- **Components and types of load balancing**

Auto-scaling

- **Get Started with Auto Scaling Using the Console**
- **Maintain a Fixed Number of Running EC2 Instances**
- **Dynamic Scaling**
- **The lifecycle of autoscaling**
- **Policies of autoscaling**

EBS (Elastic Block Storage)

- **Create EBS volumes**
- **Delete EBS Volumes**
- **Attach and detach EBS volumes**
- **Mounting and unmounting EBS volume**
- **Creating and deleting snapshots**
- **Creating volumes from snapshots S3(Simple Storage Service)**

Storage in Cloud

- **S3 durability and redundancy**
- **S3 Buckets**
- **S3 Uploading Downloading**
- **S3 Permissions**
- **S3 Object Versioning**
- **S3 Lifecycle Policies**
- **Storage Gateway**
- **Import Export**
- **S3 Transfer Acceleration**
- **Glacier storage**

Cloud Front

- **Use of cloud front**
- **Creating a cloud front distribution**
- **Hosting a website of cloud front distribution**
- **Implementing restrictions**
- **Configuring origins and behaviors**

Route53

- **Creating Zones**
- **Hosting a website**
- **Understanding routing policies**
- **Weighted simple and failover policies**

Identity Access Management (IAM)

- **Creating Users and Groups**
- **Applying policies**
- **Password Policy**
- **Roles**

AWS Security Management

- **Security Practices for Cloud Deployment**
- **AWS Responsibilities and Securities**
- **Cloud Trail**
- **Trust advisor**

Amazon Virtual Private Cloud (VPC)

- **Introduction to Amazon Virtual Private Cloud (VPC)**
- **VPC Advantages**
- **Default and Non-default VPC**
- **Components of VPC**
- **Direct Connect**
- **Describe, create, and manage Amazon Virtual Private Cloud**
- **Amazon VPC, Private Subnet, and Public Subnet**
- **AWS Networking, Security Groups, and Network ACLs**
- **Configuration and management of VPN connectivity**
- **Subnet and Subnet Mask**

Relational Database Service (RDS)

- **Introduction to RDS**
- **Different database services of AWS: Amazon RDS, Dynamo DB, Redshift etc.**
- **Configuring the database**
- **Configuring backups**
- **Configuring the maintenance windows**

- **Connecting to the database**

Dynamo DB

- **Creating a dynamo dB**
- **Configuring alarms**
- **Adding data manually**

Management Tools

- **Cloud watch dashboard**
- **Configuring Monitoring services**
- **Setting thresholds**
- **Configuring actions**
- **Creating a cloud watch alarm**
- **Getting statistics for ec2 instances**
- **Monitoring other AWS services**
- **Configuring Notifications**
- **Integrating cloud watch with Autoscaling**
- **Cloud Trail**

Application Services

- **What is SNS**
- **Creating a topic**
- **Create subscription**
- **Subscribed to the subscription**
- **SQS**
- **SES**
- **Lambda and Elastic Beanstalk**

AWS Troubleshooting

- **Troubleshooting EC2 instance**
- **Troubleshooting using Cloud watch**
- **Troubleshooting using ELB**
- **Troubleshooting by using Cloud trail**
- **Troubleshooting by using Cloud front**

IOT Security & Penetration Testing

MODULE 1 :- The IOT Security testing Overview

MODULE 2 :- Case Study: Connected and Self-Driving

MODULE 3 :- Vehicles Security

MODULE 4 :- Case Study: Microgrids

MODULE 5 :- Case Study: Smart City Drone System

MODULE 6 :- IOT Hardware and Software

MODULE 7 :- Communication and Messaging Protocols

MODULE 8 :- IOT Interfaces and Services

MODULE 9 :- Threats, Vulnerabilities and Risks

MODULE 10 :- Case Study: The Mirai Botnet Opens Up

MODULE 11 :- Pandora's Box

MODULE 12 :- Today's Attack Vector

MODULE 13 :- Current IOT Security Regulations

MODULE 14 :- Current IOT Privacy Regulations

MODULE 15 :- What is Threat Modeling

MODULE 16 :- An Introduction to IOT Security Architectures

MODULE 17 :- Identifying Assets

MODULE 18 :- Creating a System Architecture

MODULE 19 :- Documenting Threats

MODULE 20 :- Rating Threats

MODULE 21 :- IOT Privacy Concerns

MODULE 22 :- Privacy By Design (PbD)

MODULE 23 :- Conducting a Privacy Impact Assessments

Server Security & Penetration Testing

Implement and manage Storage Spaces and Data Deduplication
Install and configure Microsoft Hyper-V
Deploy, configure, and manage Windows and Hyper-V containers
High avaiPracticalility and disaster recovery technologies in Windows Server 2016
Plan, create, and manage a failover cluster
Implement failover clustering for Hyper-V virtual machines
Implement Domain Name System (DNS)
Implement and manage IP address management (IPAM)
Plan for remote access
Implement DirectAccess
Implement virtual private networks (VPNs)
Implement networking for branch offices
Implement AD DS in complex environments
Implement AD DS sites, and configure and manage replication
Implement and manage Group Policy Objects (GPOs)
Manage user settings by using GPOs
Secure AD DS and user accounts
Implement and manage a certificate authority (CA) hierarchy with AD CS
Deploy and manage certificates
Implement and administer AD FS

Exam 70-740: Installation, Storage, and Compute with Windows Server 2016

Practical 1: Installing and Configuring Nano Server
Practical 2: Configuring Local Storage
Practical 3: Planning and Configuring Storage Technologies and Components
Practical 4: Implementing Storage Spaces
Practical 5: Implementing Data Deduplication
Practical 6: Installing and Configuring Hyper-V
Practical 7: Installing and Configuring Containers
Practical 8: Planning and Implementing a High AvaiPracticalility and Disaster Recovery Solution
Practical 9: Implementing a Failover Cluster
Practical 10: Managing a Failover Cluster
Practical 11: Implementing Failover Clustering with Hyper-V
Practical 12: Implementing an NLB Cluster
Practical 13: Using MDT to Deploy Windows Server 2016
Practical 14: Implementing WSUS and Deploying Updates
Practical 15: Monitoring and Troubleshooting Windows Server 2016

Exam 70-741: Networking with Windows Server 2016

Practical 1: Planning an IPv4 Network
Practical 2: Implementing and Troubleshooting an IPv4 network
Practical 3: Implementing DHCP
Practical 4: Configuring and Evaluating IPv6 Transition Technologies
Practical 5: Planning and Implementing Name Resolution by Using DNS
Practical 6: Integrating DNS with Active Directory
Practical 7: Configuring Advanced DNS Settings
Practical 8: Implementing IPAM
Practical 9: Implementing Web Application Proxy
Practical 10: Implementing DirectAccess by Using the Getting Started Wizard
Practical 11: Deploying an Advanced DirectAccess Solution
Practical 12: Implementing a VPN
Practical 13: Implementing DFS for Branch Offices
Practical 14: Implementing BranchCache
Practical 15: Configuring Advanced Hyper-V Networking Features
Practical 16: Deploying Network Controller

Exam 70-742: Identity with Windows Server 2016

Practical 1: Deploying and Administering AD DS
Practical 2: Managing AD DS objects
Practical 3: Administering AD DS
Practical 4: Domain and Trust Management in AD DS
Practical 5: Implementing AD DS Sites and Replication
Practical 6: Implementing a Group Policy Infrastructure
Practical 7: Troubleshooting a Group Policy Infrastructure
Practical 8: Managing User Settings with GPOs
Practical 9: Securing AD DS
Practical 10: Deploying and Configuring a Two-Tier CA Hierarchy
Practical 11: Deploying and Using Certificates
Practical 12: Implementing AD FS
Practical 13: Implementing an AD RMS Infrastructure
Practical 14: Configuring Directory Synchronization
Practical 15: Recovering Objects in AD DS

Machine Learning Security & Penetration Testing

Module 1

- **Introduction**
- **What is Machine Learning**
    - **Definitions – Theoretical**
    - **Definitions – Applied Practice**
- **What is Artificial Intelligence**
    - **Definitions – Theoretical**

- o **Definitions – Applied Practice**
- **Machine Learning vs AI**
- **Machine Learning vs Deep Learning**
- **What makes Machine Learning tick**
  - o **Algorithms**
    - **History, Authors**
    - **Purpose or Objective (Minimize Error or Cost Function)**
    - **Variety of Algorithms**
      - **Learning Style**
      - **Similarity Style**
    - **Number of Algorithms**
    - **Infographic**
    - **Top 10/Most Common ML Algorithms**
- **Types of Machine Learning**
  - o **Supervised**
  - o **Unsupervised**
  - o **Reinforcement**
- **General Steps or Process of Machine Learning**
  - o **SourceX -> Feature Extraction -> Feature Correlation ->**
  - o **Feature TransformX-> Train Model-> Ensemble-> Evaluate**
  - o **Data cleaning, data transform/fitting**
  - o **Overfitting, Underfitting, Variance, Bias**
- **Required Maths**
  - o **Linear Algebra - In Numpy**
  - o **Probability**
  - o **Stats**
  - o **Calculus (Derivates)**
- **Tool Kit**
  - o **Python Basics**
  - o **Python Advance**
  - o **Numpy**
  - o **Pandas**
  - o **Matplotlib**
  - o **Scikit-learn or sklearn Library**

Module 2

- **Supervised Learning**
  - o **Classification**
    - **Random Forest**
    - **Decision Trees**
    - **Logistic Regression**
    - **Support Vector Machines**
    - **KNN**
    - **Naïve Bayes**
    - **Usage**
  - o **Regression**
    - **Linear Regression**
    - **Regularization Techniques (LASSO)**

- - Polynomial Regression
    - Usage
  - Case Study (Classification)

Module 3

Unsupervised Learning

- Clustering
  - K-Means
  - K Nearest Neighbours
  - Association Rule Learning
- Dimensionality Reduction
  - PCA
  - SVD
  - tSNE
- Case Study (Clustering/Anomaly/Fraud Detection)

Module 4

- **Reinforcement Learning**
  - Markov Decision
  - Monte Carlo Prediction
  - Case Study (next best offer, dynamic pricing)

Module 5

- **Neural Networks/Deep Learning**
  - CNN
  - RNN/LSTM/GRU
  - Transfer Learning
  - Case Study (CNN)
- **Natural Language Processing**
  - Text Mining
  - Generation
  - Case Study (Generation)
- **Predictive Analytics – Forecasting**
  - Logistic
  - Time Series (ARIMA)
  - Case Study (Time Series)
- **Ensemble Techniques**
  - Boosting
  - Bagging

Module 6

- **Machine Learning Applications across Industries**
  - Healthcare
  - Retail

- Financial Services
- Manufacturing
- Hospitality
- **Cloud Based ML Offerings**
- **Top 10 AI Startups**
- **Flashcards (Tips, Tricks, Definitions)**