

VERSION

2
4

CRASH COURSE

SR. CODE

EAPL/CRASH/CRTC21

COURSE CODE

EACCH

SUB CATEGORY

NETWORKING & SECURITY



TOTAL DURATION
45
HOURS



THEORY TAKEN
09
HOURS



PRACTICAL TAKEN
36
HOURS

ELYSIUM
ACADEMY
COMPTIA-
HARDWARE A+
COURSE
**ELYSIUM
ACADEMY
COMPTIA-
HARDWARE A+
COURSE**

ELYSIUM
ACADEMY
COMPTIA-
HARDWARE A+
COURSE

COURSE DESCRIPTION



CompTIA A+ 220-1102 covers Install, configure, and maintain computer equipment, mobile devices, and software for end users. Understand networking basics and apply basic cybersecurity methods to mitigate threats. Apply troubleshooting skills and provide customer support using appropriate communication skills. Properly and safely diagnose, resolve, and document common hardware and software issues.

COURSE GOALS



CompTIA A+ 220-1102 understands the basics of scripting, cloud technologies, virtualization, and multi-OS deployments in corporate environments. Industry standards and best practices for documentation, change management, disaster prevention and recovery, procedures and policies.

FUTURE SCOPE



Your potential is unrestricted with CompTIA A+ Certification. Because the certification does not emphasize vendor-specific software and hardware, you may concentrate on building your technical foundation and becoming familiar with the technical vocabulary you will need for your chosen career path. You have unfettered access to high-demand careers, such as cybersecurity and computer networking, with the CompTIA A+ certification. It addresses operating system installation and configuration, enhanced security, software troubleshooting, and operational processes

MOBILE DEVICES

01

CHAPTER

01.INSTALL AND CONFIGURE LAPTOP HARDWARE

01.Hardware/device Replacement

- a.Battery
- b.Keyboard/keys
- c.Random-access memory (RAM)
- d.Hard disk drive (HDD)/solid state drive (SSD) migration
- e.HDD/SSD replacement
- f. Wireless cards

02.Physical Privacy and Security Components

- a.Biometrics
- b.Near-field scanner features

02.DISPLAY COMPONENTS OF MOBILE DEVICE TYPES

01.Liquid crystal display (LCD)

- a.In-plane switching (IPS)
- b.Twisted nematic (TN)
- c.Vertical alignment (VA)

02.Organic light-emitting diode (OLED)

- a.Mobile display components
- b.WiFi antenna connector/placement
- c.Camera/webcam
- d.Microphone
- e.Touch screen/digitizer
- f.Inverter


01
HRS


02
HRS

02

CHAPTER

CONFIGURE ACCESSORIES

01. Connection methods

- a. Universal Serial Bus (USB)/ USB-C/ microUSB/miniUSB
- b. Lightning
- c. Serial interfaces
- d. Near-field communication (NFC)
- e. Bluetooth
- f. Hotspot

02. Accessories

- a. Touch pens
- b. Headsets
- c. Speakers
- d. Webcam
- e. Docking station
- f. Port replicator
- g. Trackpad/drawing pad



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01
HRS

03

CHAPTER

MOBILE-DEVICE NETWORK CONNECTIVITY

01. Wireless/cellular data network (enable/disable)

- a. 2G/3G/4G/5G
- b. Hotspot
- c. Global System for Mobile Communications (GSM) vs. code-division multiple access (CDMA)
- e. Preferred Roaming List (PRL) updates



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01
HOUR

O2. Bluetooth

- a. Global Positioning System (GPS) services
- b. Cellular location services

O3. Mobile device management (MDM)/mobile application management (MAM)

- a. Corporate email configuration
- b. Two-factor authentication
- c. Corporate applications

O4. Mobile device synchronization

- a. Account setup
 - Microsoft 365
 - Google Workspace
 - iCloud
- b. Data to synchronize
 - Mail
 - Photos
 - Calendar
 - Contacts
 - Recognizing data caps

NETWORKING

04

CHAPTER

TRANSMISSION CONTROL PROTOCOL (TCP) AND USER DATAGRAM PROTOCOL (UDP)


01
HRS


02
HRS

01. Ports and protocols

- a.20/21 – File Transfer Protocol (FTP)
- b.22 – Secure Shell (SSH)
- c.23 – Telnet
- d.25 – Simple Mail Transfer Protocol (SMTP)
- e.53 – Domain Name System (DNS)
- f.67/68 – Dynamic Host Configuration Protocol (DHCP)
- g.80 – Hypertext Transfer Protocol (HTTP)
- h.110 – Post Office Protocol 3 (POP3)
- i.137/139 – Network Basic Input/ Output System (NetBIOS)/ NetBIOS over TCP/IP (NetBT)
- j.143 – Internet Mail Access Protocol (IMAP)
- k.161/162 – Simple Network Management Protocol (SNMP)
- l. 389 – Lightweight Directory Access Protocol (LDAP)
- m.443 – Hypertext Transfer Protocol Secure (HTTPS)
- n.445 – Server Message Block (SMB)/Common Internet File System (CIFS)
- o.3389 – Remote Desktop Protocol (RDP)

O2.TCP vs. UDP

a.Connectionless

- DHCP
- Trivial File Transfer Protocol (TFTP)

b.Connection-oriented

- HTTPS
- SSH

05

CHAPTER

COMMON NETWORKING HARDWARE

a.Routers

b.Switches

- Managed
- Unmanaged

c.Access points

d.Patch panel

e.Firewall

f.Power over Ethernet (PoE)

- Injectors
- Switch
- PoE standards

g.Hub

h.Cable modem

i.Digital subscriber line (DSL)

j.Optical network terminal (ONT)

k.Network interface card (NIC)

l.Software-defined networking (SDN)



06

CHAPTER

01. CONTRAST PROTOCOLS FOR WIRELESS NETWORKING

a. Frequencies

- 2.4GHz
- 5GHz

b. Channels

- Regulations
- 2.4GHz vs. 5GHz

c. Bluetooth

d. 802.11

- a
- b
- g
- n
- ac (WiFi 5)
- ax (WiFi 6)

e. Long-range fixed wireless

- Licensed
- Unlicensed
- Power
- Regulatory requirements for wireless power

f. NFC

g. Radio-frequency identification (RFID)



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02.NETWORKED HOSTS

01. Server Roles

- a.DNS
- b.DHCP
- c.Fileshare
- d.Print servers
- e.Mail servers
- f.Syslog
- g.Web servers
- h.Authentication, authorization,
and accounting (AAA)

02.Internet Appliances

- a.Spam gateways
- b.Unified threat management (UTM)
- c.Load balancers
- d.Proxy servers

03.Legacy/Embedded Systems

- a.Supervisory control and data
acquisition (SCADA)

04.Internet of Things (IoT) Devices

07

CHAPTER

01.INSTALL AND CONFIGURE (SOHO)



30
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1.5
HOURS

01. Internet Protocol (IP) Addressing

a.IPv4

- Private addresses
- Public addresses

b.IPv6

c.Automatic Private IP Addressing (APIPA)

d.Static

e.Dynamic

f.Gateway

02.COMMON NETWORK CONFIGURATION

01.DNS

a.Address

- A
- AAAA

b.Mail exchanger (MX)

c.Text (TXT)

- Spam management

(i) DomainKeys Identified Mail (DKIM)

(ii) Sender Policy Framework (SPF)

(iii) Domain-based Message Authentication, Reporting, and Conformance (DMARC)

08

CHAPTER

INTERNET CONNECTION AND NETWORK TYPES

O1. Internet Connection Types

- a.Satellite
- b.Fiber
- c.Cable
- d.DSL
- e.Cellular
- f.Wireless Internet service provider (WISP)

O2.Network types

- a.Local area network (LAN)
- b.Wide area network (WAN)
- c.Personal area network (PAN)
- d.Metropolitan area network (MAN)
- e.Storage area network (SAN)
- f.Wireless local area network (WLAN)


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09

CHAPTER

NETWORKING TOOLS

- a.Crimper
- b.Cable stripper
- c.WiFi analyzer
- d.Toner probe
- e.Punchdown tool
- f.Cable tester
- g.Loopback plug
- h.Network tap


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HARDWARE

10 CHAPTER

CABLE TYPES AND THEIR CONNECTORS

O1. Network Cables

a. Copper

- Cat 5
- Cat 5e
- Cat 6
- Cat 6a
- Coaxial
- Shielded twisted pair

(i) Direct burial

- Unshielded twisted pair

b. Plenum

c. Optical

- Fiber

d. T568A/T568B

O2. Peripheral cables

a. USB 2.0

b. USB 3.0

c. Serial

d. Thunderbolt

O3. Video cables

a. High-Definition Multimedia Interface (HDMI)

b. DisplayPort

c. Digital Visual Interface (DVI)

d. Video Graphics Array (VGA)



O4.Hard drive cables

- a.Serial Advanced Technology Attachment (SATA)
- b.Small Computer System Interface (SCSI)
- c.External SATA (eSATA)
- d.Integrated Drive Electronics (IDE)

O5.Adapters

O6.Connector types

- a.RJ11
- b.RJ45
- c.F type
- d.Straight tip (ST)
- e.Subscriber connector (SC)
- f.Lucent connector (LC)
- g.Punchdown block
- h.microUSB
- i.miniUSB
- j.USB-C
- k.Molex
- l.Lightning port
- m.DB9

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CHAPTER

INSTALL THE APPROPRIATE RAM

O1.RAM types

- a.Virtual RAM
- b.Small outline dual inline memory module (SODIMM)
- c.Double Data Rate 3 (DDR3)
- d.Double Data Rate 4 (DDR4)
- e.Double Data Rate 5 (DDR5)
- f.Error correction code (ECC) RAM

O2.Single-channel

O3.Dual-channel

O4.Triple-channel

O5.Quad-channel



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CHAPTER

INSTALL STORAGE DEVICES

O1.Hard Drives

- a.Speeds
 - 5,400rpm
 - 7,200rpm
 - 10,000rpm
 - 15,000rpm
- b.Form factor
 - 2.5
 - 3.5



O2.SSDs

a.Communications interfaces

- Non-volatile Memory Express (NVMe)
- SATA
- Peripheral Component Interconnect Express (PCIe)

b.Form factors

- M.2
- mSATA

O3.Drive configurations

a.Redundant Array of Independent (or Inexpensive) Disks (RAID) 0, 1, 5, 10

O4.Removable storage

a.Flash drives

b.Memory cards

c.Optical drives

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CHAPTER

CONFIGURE MOTHERBOARDS, CENTRAL PROCESSING UNITS (CPUS)

O1.Motherboard form factor

- a.Advanced Technology eXtended (ATX)
- b.Information Technology eXtended (ITX)

O2.Motherboard connector types

- a.Peripheral Component Interconnect (PCI)
- b.PCI Express (PCIe)



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c.Power connectors

d.SATA

e.eSATA

f.Headers

g.M.2

O3.Motherboard Compatibility

a.CPU sockets

· Advanced Micro Devices, Inc. (AMD)

· Intel

b.Server

c.Multisocket

d.Desktop

e.Mobile

O4.Basic Input/Output System (BIOS)/Unified Extensible Firmware Interface (UEFI) settings

a.Boot options

b.USB permissions

c.Trusted Platform Module (TPM) security features

d.Fan considerations

e.Secure Boot

f.Boot password

O5.Encryption

a.TPM

b.Hardware security module (HSM)

O6.CPU architecture

- a.x64/x86
- b.Advanced RISC Machine (ARM)
- c.Single-core
- d.Multicore
- e.Multithreading
- f.Virtualization support

O7.Expansion cards

- a.Sound card
- b.Video card
- c.Capture card
- d.NIC

O8.Cooling

- a.Fans
- b.Heat sink
- c.Thermal paste/pads
- d.Liquid

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CHAPTER

POWER SUPPLY

- a.Input 110-120 VAC vs. 220-240 VAC
- b.Output 3.3V vs. 5V vs. 12V
- c.20-pin to 24-pin motherboard adapter
- d.Redundant power supply
- e.Modular power supply
- f.Wattage rating


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CHAPTER

PRINTERS AND SETTINGS

O1. Properly unboxing a device – setup location considerations

O2. Use appropriate drivers for a given OS

a. Printer Control Language (PCL) vs. PostScript

O3. Device connectivity

a. USB

b. Ethernet

c. Wireless

O4. Public/shared devices

a. Printer share

b. Print server

O5. Configuration settings

a. Duplex

b. Orientation

c. Tray settings

d. Quality

O6. Security

a. User authentication

b. Badging

c. Audit logs

d. Secured prints

O7. Network scan services

a. Email

b. SMB

c. Cloud services

O8. ADF/flatbed scanner



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CHAPTER

INSTALL AND REPLACE PRINTER CONSUMABLES


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O1. Laser

- a. Imaging drum, fuser assembly, transfer belt, transfer roller, pickup rollers, separation pads, duplexing assembly
- b. Imaging process: processing, charging, exposing, developing, transferring, fusing, and cleaning
- c. Maintenance: Replace toner, apply maintenance kit, calibrate, clean

O2. Inkjet

- a. Ink cartridge, print head, roller, feeder, duplexing assembly, carriage belt
- b. Calibration
- c. Maintenance: Clean heads, replace cartridges, calibrate, clear jams

O3. Thermal

- a. Feed assembly, heating element
- b. Special thermal paper
- c. Maintenance: Replace paper, clean heating element, remove debris
- d. Heat sensitivity of paper

O4. Impact

- a. Print head, ribbon, tractor feed
- b. Impact paper
- c. Maintenance: Replace ribbon, replace print head, replace paper

O5.3-D printer

- a.Filament
- b.Resin
- c.Print bed

VIRTUALIZATION AND CLOUD COMPUTING

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CHAPTER

CLOUD-COMPUTING CONCEPTS

O1.Common cloud models

- a.Private cloud
- b.Public cloud
- c.Hybrid cloud
- d.Community cloud
- e.Infrastructure as a service (IaaS)
- f.Software as a service (SaaS)
- g.Platform as a service (PaaS)

O2.Cloud characteristics

- a.Shared resources
- b.Metered utilization
- c.Rapid elasticity
- d.High availability
- e.File synchronization

O3.Desktop virtualization

- a.Virtual desktop infrastructure (VDI) on premises
- b.VDI in the cloud



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CHAPTER

CLIENT-SIDE VIRTUALIZATION

O1. Purpose of virtual machines

- a. Sandbox
- b. Test development
- c. Application virtualization
 - Legacy software/OS
 - Cross-platform virtualization

O2. Resource requirements

O3. Security requirements



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HARDWARE AND NETWORK TROUBLESHOOTING

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CHAPTER

PRACTICE METHODOLOGY TO RESOLVE PROBLEMS

O1. Always consider corporate policies, procedures and impacts before implementing changes

- a. Identify the problem
 - Gather information from the user, identify user changes, and, if applicable, perform backups before making changes
 - Inquire regarding environmental or infrastructure changes



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O2. Establish a theory of probable cause

- a. If necessary, conduct external or internal research based on symptoms

O3. Test the theory to determine the cause

- a. Once the theory is confirmed, determine the next steps to resolve the problem
- b. If the theory is not confirmed, re-establish a new theory or escalate

O4. Establish a plan of action to resolve the problem and implement the solution

- a. Refer to the vendor's instructions for guidance

O5. Verify full system functionality and, if applicable, implement preventive measures

O6. Document the findings, actions, and outcomes

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CHAPTER

TROUBLESHOOT MOTHERBOARDS, RAM, CPU, AND POWER

01.Common symptoms

- a.Power-on self-test (POST) beeps
- b.Proprietary crash screens
(blue screen of death [BSOD]/
pinwheel)
- c.Black screen
- d.No power
- e.Sluggish performance
- f.Overheating
- g.Burning smell
- h.Intermittent shutdown
- i.Application crashes
- j.Grinding noise
- k.Capacitor swelling
- l.Inaccurate system date/time



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CHAPTER

DIAGNOSE PROBLEMS WITH STORAGE DRIVES

01.Common symptoms

- Light-emitting diode (LED)
status indicators
- Grinding noises
- Clicking sounds
- Bootable device not found



- e.Data loss/corruption
- f.RAID failure
- g.Self-monitoring, Analysis, and Reporting Technology (S.M.A.R.T.) failure
- h.Extended read/write times
- i.Input/output operations per second (IOPS)
- j.Missing drives in OS

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CHAPTER

TROUBLESHOOT VIDEO, PROJECTOR, AND DISPLAY ISSUES

01.Common symptoms

- a.Incorrect data source
- b.Physical cabling issues
- c.Burned-out bulb
- d.Fuzzy image
- e.Display burn-in
- f.Dead pixels
- g.Flashing screen
- h.Incorrect color display
- i.Audio issues
- j.Dim image
- k.Intermittent projector shutdown



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CHAPTER

TROUBLESHOOT MOBILE DEVICES

01.Common symptoms

- a.Poor battery health
- b.Swollen battery
- c.Broken screen
- d.Improper charging
- e.Poor/no connectivity
- f.Liquid damage
- g.Overheating
- h.Digitizer issues
- i.Physically damaged ports
- j.Malware
- k.Cursor drift/touch calibration


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CHAPTER

TROUBLESHOOT AND RESOLVE PRINTER ISSUES

01.Common symptoms

- a.Lines down the printed pages
- b.Garbled print
- c.Toner not fusing to paper
- d.Paper jams
- e.Faded print
- f.Incorrect paper size
- g.Paper not feeding
- h.Multipage misfeed


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- i. Multiple prints pending in queue
- j. Speckling on printed pages
- k. Double/echo images on the print
- l. Incorrect color settings
- m. Grinding noise
- n. Finishing issues
 - Staple jams
 - Hole punch
- o. Incorrect page orientation

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CHAPTER

TROUBLESHOOT PROBLEMS WITH WIRED AND WIRELESS NETWORKS

01. Common symptoms

- a. Intermittent wireless connectivity
- b. Slow network speeds
- c. Limited connectivity
- d. Jitter
- e. Poor Voice over Internet Protocol (VoIP) quality
- f. Port flapping
- g. High latency
- h. External interference



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