

Course Descriptions

A+ CERTIFIED SERVICE TECHNICIAN

Description

A+ Certified Service Technician can be implemented as a 35 to 50-hour course that prepares students for both the Hardware Technologies certification exam and the OS Technologies exam which make up CompTIA's A+ technical certification. This course provides students with hands-on experience and the concepts necessary to install, service, and support personal computers (PCs).

Textbooks

A+ Computer Hardware, Nexes ISBN: 1-931036-24-1

A+ Operating Systems, Nexes ISBN:1-931036-26-8

Adaptec ACE CD



Objectives

This course is designed to prepare students for the Computing Technology Industry Association (CompTIA) A+ technical certification examination. This course is also intended for use as a general introduction to PC hardware and software concepts, and as an introductory training course for computer technicians. It is a logical first step for students interested in pursuing more advanced technical education.

Achieving A+ certified status will provide students with an industry recognized technical credential that can assist them in securing entry-level PC technician positions. This will allow students to begin crucial on-the-job technical expertise to assist in securing more advanced positions.

Course Prerequisites

There are no course prerequisites for this course. This course assumes minimal prior familiarity or usage of personal computers.

Setup Guidelines

This course places a heavy emphasis on familiarity with hardware components and prevalent PC operating systems. As such, in setting up the classroom environment, each student should have access to a PC capable of running DOS, Windows 3.x, Windows 95, Windows 98, and Windows 2000 Professional. Additionally, the instructor should have a machine capable of supporting the same operating systems, and should have access to a projection system that will allow students to view and emulate instructor actions.

Additionally, this course is best when students can interact with hardware components. Consider having on hand additional network cards, hard disks, system boards, CD-ROM drives, processors (ranging from pre-Pentium to as current as possible), memory modules, cables, sound cards, keyboards, pointing devices, and printers. Ideally, students should also have the opportunity to work with functional components for assembly into a working computer.

Available software should include DOS installation disks, Windows 95/98 installation disks, and Windows 2000 Professional installation CD. As well, DOS boot disks with FDISK, FORMAT, and EDIT would also be beneficial. Additional floppy diskettes for creation of startup and emergency repair disks (ERD) is also beneficial.

Outcomes

Upon course completion, students will have an understanding of the basics of computer hardware components and operating system software, and how they work together.

Upon completion of the hardware portion of this course, students will be able to:

- ?? identify the basic hardware components of a personal computer
- ?? identify different types of memory (physical and logical)
- ?? understand the basic logical and physical structure of a hard disk
- ?? identify common PC peripherals
- ?? identify different types of printers and understand how they function
- ?? understand basic components of local area networks
- ?? identify and correct common hardware problems
- ?? use software and hardware diagnostic tools

Upon completion of the Operating Systems Technologies portion of the course, students will be able to:

- ?? understand and use basic MS-DOS commands
- ?? quantify memory usage by applications and device drivers
- ?? identify the different components of the CONFIG.SYS and AUTOEXEC.BAT files and understand their uses
- ?? understand the interfaces of Windows 95, 98, and Windows 2000
- ?? understand the differences between Windows 95, 98, and Windows 2000
- ?? identify and troubleshoot common operating system problems

Detailed Topics Hardware Technologies

Lesson 1: Introduction

This lesson introduces the phenomenon of certification in the IT professional community with particular attention to CompTIA and the A+ certification. The following topics are addressed:

- The CompTIA Certification Suite
- The A+ examinations
- Preparing for the exam
- Registering for exams?
- Completing the examinations
- Remaining certified
- A+ exam changes

Lesson 2: Basic Electronics

This lesson introduces students to the basics of electricity and electrical safety. Students will be exposed to and be able to relate fundamental concepts of electricity as well as safety issues as they relate to performing maintenance on PC computer systems. Topics include:

- Alternating current
- Direct current
- Using a multimeter
- Electrical safety

Lesson 3: Preventing ESD

This lesson introduces students to the concept of static electricity and its impact on computing environments. Particular attention is paid to the correct procedures to minimize the possibility of Electro-static discharge. Topics include:

- Defining static electricity and electrostatic discharge
- ESD damage Preventing ESD damage
- Understand the correct use of ESD wristband or ankle strap equipment
- Understand the correct use of ESD floor or table mats
- Understand the correct use of ESD garments
- Understand the correct use of ESD gloves or finger coverings
- Understanding the relevance of Humidity in computer environments
- Using anti- static bags

The following lab topics are also covered:

- Assembling an ESD Workstation
- Mounting a Computer on to the ESD Workstation
- Testing the ESD Workstation

Lesson 4: Preventing EMI and RFI

This lesson introduces students to the concept of both Electro-Magnetic Interference and Radio Frequency Interference and its impact on computing environments. Topics include:

- Defining EMI
- Identifying EMI
- Avoiding EMI
- Defining RFI
- Identifying RFI
- Avoiding RFI

Lesson 5: Technicians' Tools

This lesson covers the basic software and hardware tools commonly used by computer technicians to service PC computers. Topics include:

- Technician's Tools
- Standard hand tools
- Specialized diagnostic tools

Lesson 6: System Boards

This lesson introduces student to the structure and purpose of main system boards. Topics include:

System boards defined
System board evolution

Lesson 7: Computer Cases, Power Supplies, and Battery Backups

This lesson introduces students to the various types of computer cases, power supplies and battery backup and discusses the correct implementation of each. Topics include:

- Computer cases
- Features of computer cases
- Power supplies and system boards
- Power supplies and connected devices
- Power problems
- Fluctuations in voltage
- Under- voltage protection
- Standby power supplies .
- Un-interruptible power supplies

The following lab topics are discussed:

- Exercise 1: Removeing the Power Supply
- Exercise 2: Installing a Power Supply

Lesson 8: System Settings: BIOS, IRQ, I/ O, and DMA

This lesson introduces students to both select system components as well as the concept and management of system resources.

- Basic input/ output system (BIOS) and CMOS
- Interrupt request (IRQ) lines
- I/ O settings
- The Hexadecimal numbering system
- Back to I/ O addresses
- DMA channels

The following lab exercises are also included:

- Exercise 1: Access CMOS Settings
- Exercise 2: Modify CMOS Setting
- Exercise 3: Password Protect the CMOS
- Exercise 4: Disable a CMOS Password

Lesson 9: The Central Processing Unit

This lesson introduces students to the function evolution of the Central Processing Unit. Topics include:

- Defining a CPU
- CPU/Memory bus dataflow
- CPU types
- Processor levels

Lesson 10: Expansion Bus Architecture

This lesson discusses the purpose, function and use of the PC expansion bus system. Topics include:

- Introducing the PC expansion bus
- Structure of the PC expansion bus
- Working with the PC expansion bus

Lesson 11: Physical Memory

This lesson introduces students to memory chipsets, their types and characteristics. Topics include:

- Random access memory defined
- Physical memory packaging
- Types of memory
- System DRAM
- Video DRAM
- Read- only memory

Lesson 12: Data Storage

This lesson introduces students to PC data storage technologies and peripherals. Topics include

- Understanding data storage
- Floppy diskettes and floppy disk drives
- Disk developments
- Hard disks
- Inside hard disks
- Hard disk interfaces
- ST506 interface
- Enhanced small device interface (ESDI)
- Integrated device electronics (IDE)
- Enhanced IDE (EIDE)
- Small computer system interface (SCSI)
- Evaluating hard disk performance
- Providing fault tolerance
- Alternative storage media
- CD- ROM
- CD- ROM data transfer rates
- Digital video disc/ digital versatile disc (DVD)
- Zip and Jaz drives
- PC Cards
- Removable hard drives
- Tape backup drives

Lab - Install an IDE Drive

-Exercise 1: Install an IDE CDROM Drive

Lab - Configure SCSI Devices

-Exercise 1: Configure an SCSI Device

Lesson 13: I/ O Ports and Connectors

- Ports defined
- Serial ports
- Industry Standards
- Parallel ports
- Keyboard ports
- Mouse ports
- Video ports
- Game ports
- USB ports

The following lab exercises are also included in this lesson:

-Exercise 1: Removing an Add- on Card

-Exercise 2: Installing an AGP Video Card

Lesson 14: Common I/ O Devices

This lesson covers common input-output devices, their types, use and connection characteristics. Topics include:

- Input devices defined
- Keyboards
- Pointing devices
- Mouse devices
- Other pointing devices
- Voice recognition
- Joysticks
- Video capture cards
- Digital cameras
- Scanners
- Output devices
- Monitors
- Printers
- Modems
- Sound cards

Lesson 15: Printers and Scanners

This lesson details printer technology providing student with an overview of the various types of print devices and technologies used by each. Topics include:

- Printer technology
- Impact printers
- Daisy wheel printers
- Dot- matrix printers
- Line printers
- Ink Ribbons
- Non- impact printers
- Thermal printers
- Ink- jet printers
- Laser printers
- The electro-photographic print process
- Print quality
- Installing printers
- Scanners

The following labs are also included in this lesson:

- Exercise 1: Install Printer Drivers
- Exercise 2: Share a Printer and Connect to a Shared Printer

Lesson 16: System Startup Sequence

This lesson overviews the PC startup sequence, specifically the steps associated with a PC Power On Self Test routine, including their relevance and troubleshooting.

Lesson 17: Portable Computing

This lesson summarizes PC issues and technologies associated with portable computers. Topics include:

- The evolution of portable computing
- Portable computing hardware
- Device size considerations
- Expansion capabilities
- Portable power
- Other portable computer considerations

Lesson 18: Network Basics

This lesson introduces students to basic networking concepts and terminology. Topics include:

- Networking concepts
- The logon process
- Networking models
- Peer- to- peer networking
- Server- centric networking
- LANs and WANs 309

Lesson 19: Network Cabling and Topology

This lesson contrasts some of the various networking media types and review the primary types of network topologies. Topics include:

- Broadband and baseband transmissions
- Coaxial cable
- Twisted- pair cable
- Fiber- optic cable
- Running cable
- Network topologies
- Bus topology
- Star topology
- Ring topology
- Mesh topology

Lesson 20: Networking Concepts

In this lesson students are introduced to basic networking architecture theory and access methods. Topics include:

- The OSI reference model
- The seven layers of the OSI model
- Network access methods
- Network architecture
- Ethernet
- Token ring
- ARCnet
- FDDI
- Wireless technologies

Lesson 21: Networking Protocols

In this lesson students will review the concept of networking protocols and review some common examples along with their differentiating characteristics.

- Network protocols
- NetBEUI, IPX/ SPX, and AppleTalk
- NetBEUI
- IPX/ SPX
- AppleTalk
- TCP/ IP
- IP addressing

Lab exercises in this lesson include:

- Exercise 1: Determine the IP Address
- Exercise 2: Test TCP/ IP Connectivity

Lesson 22: Network Hardware

This lesson introduces students to various network hardware devices, highlighting the primary and differentiating characteristics.

- Network hardware
- Network interface card (NIC)
- Network cable
- Repeaters
- Hubs
- Bridges
- Routers and Brouters
- Gateways
- Switches

Lab exercises in this lesson include:

- Exercise 1: Install Network Hardware
- Exercise 2: Install File and Print Sharing
- Exercise 3: Share a directory
- Exercise 4: Map a Network Drive

Lesson 23: Troubleshooting

This lesson overviews troubleshooting concepts, philosophy and techniques

Lesson 24: Troubleshooting Cases, Power Supplies, System Boards, and Memory

This lesson exposes students to common issues associated with various system components. Topics include

- Troubleshooting computer cases
- Case Air flow
- Case Cleaning
- Power supply troubleshooting
- System boards troubleshooting
- Memory issue troubleshooting

Lesson 25: Troubleshooting Storage Devices

This lesson helps students understand common techniques used to troubleshoot data storage devices. Topics include:

- Troubleshooting Hard disk and floppy disk drives
- Troubleshooting CD- ROM and DVD drives
- Troubleshooting other storage media

Lesson 26: Troubleshooting I/ O Devices

This lesson highlights essential I/O device troubleshooting scenarios and techniques. Topics include:

- Troubleshooting keyboards
- Troubleshooting mouse devices
- Troubleshooting monitors

Lesson 27: Troubleshooting Adapter Cards

This lesson covers common adapter card troubleshooting situations and the technologies and techniques used to resolve system issues associated with them. Topics include:

- Troubleshooting tips for adapter cards
- Troubleshooting modems
- Troubleshooting sound cards
- Troubleshooting network interface cards

Lesson 28: Troubleshooting Printers

This lesson surveys common printing best practices as well as overviews common printing issue resolution techniques. Topics include:

- Printer planning
- Printer troubleshooting

Topics Operating Systems Technologies

Lesson 1: Introduction to the Operating System (OS) and DOS

This lesson gives students an overview of the DOS operating systems and the Windows 3.x graphical environment

Lesson 2: The File System

This lesson introduces students to the DOS File System

Lesson 3: Basic DOS Commands

This lesson introduces student to essential DOS commands. Topics include:

- DOS Command Basics
- Basic DOS Commands
- File Attributes
- Clearing the Screen
- Date & Time Commands
- Directory Commands
- Working with Files
- Altering the Command Prompt
- The VER Command

-DOS Help Options

Lesson 4: DOS Configuration Essentials

This lesson introduces students to DOS environment configuration concepts and techniques. Topics include:

- The DOS Boot Process
- Examining CONFIG. SYS and AUTOEXEC. BAT
- CONFIG. SYS
- AUTOEXEC. BAT
- DOS Disk Management Utilities
- FDISK
- FORMAT
- DEFRAG
- Logical Memory Basics
- Conventional Memory
- Upper Memory
- Expanded Memory
- Extended Memory
- Upper Memory Blocks
- Virtual Memory

Lesson 5: Understanding Windows 95

This lesson introduces students to Windows 95. Topics include:

- Examining Windows 3. x
- Examining Windows 95
- Examining Windows 95 installation requirements
- Exploring Windows 95 Versions
- Upgrading from MS- DOS to Windows
- Installing Windows 95 on a newly formatted hard disk
- Working with Plug and Play technology
- Examining Plug and Play system requirements

Lesson 6: Navigating Windows 95

This lesson introduces students to Windows 95 navigation essentials. Topics include:

- Understanding Windows 95 functions
- Examining desktop basics
- Using folders
- Examining Windows Explorer and My Computer
- Exploring the Recycle Bin
- Opening files

- Using Control Panel
- Customizing your Windows 95 desktop
- Exploring desktop properties
- Creating shortcuts
- Setting the date and time
- Arranging icons and open windows
- Using online help
- Examining the Contents tab
- Examining the Index tab
- Examining the Find tab

Lesson 7: Working with Windows 95

This lesson introduces students to essential Windows 95 system configuration operations. Topics include:

- Understanding the Windows 95 boot sequence
- Examining Plug and Play
- Loading boot files
- Interrupt- ing the boot sequence
- Booting after an improper shutdown or startup
- Booting to DOS mode
- Adding device drivers
- Adding CD- ROM drivers
- Adding modem drivers
- Installing monitor drivers and video drivers
- Installing printer drivers
- Adding sound card drivers
- Working with the Registry
- Using Registry Editor
- Understanding essential keys in Registry Editor
- Understanding shell icons

Lesson 8: Managing Windows 95

This lesson exposes students to advanced Windows 95 system configuration. Topics include:

- Working with the Windows 95 printing subsystem
- Exploring printer properties
- Installing applications in Windows 95
- Adding and removing programs in Control Panel
- Launching applications
- Using disk management utilities
- Using Microsoft Backup
- Defragmenting
- Using ScanDisk
- Disk partitioning and formatting

- Understanding VFAT
- Managing memory

Lesson 9: Networking in Windows 95

This lesson introduces students to Windows 95 networking basics. Topics include:

- Using Network Neighborhood
- Networking on a Windows 95 computer
- Installing the NIC device driver
- Installing a protocol
- Installing client software
- Sharing services
- Mapping network drives

Lesson 10: Troubleshooting in Windows 95

This lesson introduces students to Windows 95 troubleshooting techniques and utilities. Topics include:

- Examining Windows 95 errors
- Troubleshooting Safe Mode errors
- Troubleshooting blue screen errors
- Troubleshooting application errors
- Troubleshooting VFAT initialization failure
- Troubleshooting incorrect and incompatible printer drivers
- Troubleshooting system lock up
- Exploring troubleshooting tools
- Creating a boot disk
- Using an emergency repair disk (ERD)
- Using ScanDisk
- Using SYSEDIT
- Using Regedit
- Using Print Troubleshooter
- Using Device Manager
- Using Hardware Conflict Troubleshooter
- Troubleshooting in Control Panel
- Examining viruses
- Exploring the dangers of viruses
- Exploring virus symptoms
- Understanding how viruses infect computers
- Protect against viruses
- Removing viruses
- Examining types of viruses

Lesson 11: Windows 98 Basics

This lesson introduces students to Windows 98. Topics include:

- Compare Windows 95 to Windows 98
- Understand the New Features of Windows 98
- Hard Ware Requirements
- Windows Installation: Minimum Requirements
- Installing Windows 98
- Clean Install of Windows 98
- Windows 98 DOS
- Understand- ing the Boot Process
- Config. sys and Autoexec. bat
- Working with the Windows 98 Startup Menu (Safe Mode)
- Controlling Startup Using the System Configuration Utility
- Controlling Startup Using Msdos.sys
- How the Shutdown Process Works
- Creating Custom Startup and Shutdown Screens

Lesson 12: Exploring Windows 98

This lesson introduces students to Windows 98 interface navigation essentials. Topics include:

- The Welcome Screen
- Navigating Windows 98
- The Taskbar and Start button
- Customizing your desktop
- The new Internet Explorer interface

Lesson 13: Running Windows 98

This lesson introduces students to Windows 98 system configuration. Topics include:

- Windows Explorer Tips
- The Status Bar
- File Extensions
- Displaying hidden files
- File Techniques
- Shortcuts
- Checking OS Version
- Memory
- Memory Defined
- Scan Disk
- Printing
- Add Remove Hardware
- Help

Lesson 14: Networking in Windows 98

This lesson introduces students to Windows 98 networking services that build on those offered by Windows 95. Topics include:

- Window 98 Dial up Networking
- Setting Up a Dial- Up Server
- Net Watcher

Lesson 15: Troubleshooting in Windows 98

This lesson introduces students to Windows 98 troubleshooting techniques and utilities. Topics include:

- Windows 98 Setup Failures
- General Troubleshooting strategies in Windows 98
- Windows 98 Startup disk
- Using the Extract. exe to replace system files
- Win. com Switches for Start up Trouble- shooting
- Windows 98 System Information Utility
- Other Utilities in Windows 98
- Understanding GPF and Dr. Watson

Lesson 16: Windows 2000 Basics

This lesson introduces students to Windows 2000. Topics include:

- Comparison of Windows 98/ NT to Windows 2000
- Microsoft Windows 2000 expanded Features
- Minimum hardware requirements
- Recommended hardware requirements
- Optional hardware requirements
- Other Hardware/ Software Compatibility
- Installing Microsoft Windows 2000
- Understanding VFAT, FAT16, FAT32 vs. NTFS
- Installing Microsoft Windows 2000 on a newly formatted hard disk drive.
- Upgrading to Windows 2000 from Windows 95/ 98/ NT
- Creating a multiple boot configuration
- Understanding the Boot Process
- Booting in Safe Mode
- More Plug and Play

Lesson 17: Exploring Windows 2000

This lesson introduces students to Windows 2000 navigation. Topics include:

- Examining the new look and feel of Windows 2000 Professional
- Navigating and Using Toolbars
- The Active Desktop
- Navigate the Web- like folder browsing and interface customizations

Lesson 18: Running Windows 2000 Professional

This lesson introduces students to Windows 2000 system configuration and management. Topics include:

- Manage Users and Computers
- Regedit and Regedt32
- Use the new utilities in Windows 2000 Professional
- Printing
- Backup/ Restore Utilities
- Using the Disk Management Utility
- The Command Prompt Syntax and Uses
- Windows Script Host ... 373

Lesson 19: Networking in Windows 2000

This lesson introduces students to Windows 2000 network configuration. Topics include:

- Client/ Server or Peer to Peer Network
- My Network
- Creating a Share
- Using the Internet Connection Wizard

Lesson 20: Troubleshooting in Windows 2000

This lesson introduces students to Windows 2000 basic troubleshooting techniques and utilities. Topics include:

- Trouble Shooting
- Common errors and startup messages
- Using the Event Viewer
- Resource Kit
- Resource Kit Utilities
- Creating an Emergency Repair Disk
- Last Known Good Configuration
- Recovery Console
- Virus's

Appendix A: Linux

This optional exercise introduces students to the Linux operating system.

Topics include:

- A brief history of Linux
- Exercise A- 1 - Linux installation
- Overview
- Exercise requirements
- Installation tasks
- Linux management essentials
- X- Windows Essentials