



West Virginia State Community and Technical College



West Virginia State Community and Technical College is regionally accredited with the North Central Association and is a Servicemembers Opportunity College.

Computer Design and Servicing

CATALOG DESCRIPTION:

In this 60 hour course students will learn basic computer design and servicing. Students will learn the operation and maintenance of all computer components, including troubleshooting faulty components/systems. Basic networking skills will be taught in relation to troubleshooting hardware problems. Students will also be taught procedures for installing and configuring operating systems and component drivers.

COURSE OBJECTIVE:

An introduction to computer design and servicing. Students will learn the operation of all computer components and how they inter-relate. Basic computer design and compatibility of the various components will be taught in addition to troubleshooting various malfunctions. Upon successful completion of this course, the student should be able to pass the ETA (Electronics Technicians Association) Computer Service Technician examination.

COURSE LEARNING OUTCOMES:

Upon completion of the course the students should be able to:

- Assemble and disassemble a computer
- Demonstrate the proper removal and installation of a CPU
- Demonstrate the proper removal and the correct reinstallation of RAM including the use of proper banking procedures
- Explain the precautions and routines involved in the removal and installation of:
 - Power Supplies
 - Expansion cards
 - Motherboard jumpers and/or dipswitch configurations and settings on the motherboard
 - Connections on a motherboard
 - Secondary storage devices
 - Motherboards and Buses/System Resources
- Identify CPUs used in specific sockets/slots
- Explain ISA, PCI, and Extended PCI expansion slot differences
- Describe the AGP port and its function
- Compare different chipset versions and features
- Explain the purpose of IRQs and common selections for COM1, Com2, LPT1, and LPT2
- Explain the purpose and use of DMAs
- Describe the purpose of I/O addresses
- Identify memory module sockets and explain how memory is addressed
- Define the function of the Control, Memory, Data, and Address Buses
- Explain the configuration of CMOS and how to clear passwords
- Describe Flash BIOS and demonstrate the ability to upgrade/update BIOS
- Explain how BIOS Beep codes are used
- Processor Characteristics
- State the Word Size (Internal Data Bus) and External Data Path bit widths for various CPUs
- Explain the differences between the L1 and L2 cache
- Describe Advanced Transfer Cache and its benefits
- Define the purposes and uses of MMX/SSE Technologies (SIMD)
- Describe 3Dnow Technologies
- Describe Dual Independent Bus technology (frontside/backside Bus)
- Memory Characteristics

- Identify and explain the differences in SIMM, DIMM, RIMM Ram packages
- Compare RAM package bit widths
- Describe SRAM, SDRAM, DRAM, DDR, and Rambus characteristics and installation procedures
- Demonstrate proper “Banking” procedures when installing various RAM modules with various processors
- Secondary Storage Devices
- Describe EIDE hard drive technology and explain how data is stored on a hard drive
- Compare PIO modes, ATA specs, UDMA (Various Speeds)
- Describe EIDE cable differences for PIO mode/ATA33 and ATA66/ATA100 and ATA133
- Describe SCSI hard drive technology and how it differs from the EIDE interface
- Describe the CD-ROM/CD-RW technology and state its advantages and uses
- Compare DVD, DVD-RAM, DVD-RW, and DVD+RW technologies
- Explain the applications for USB drive
- Explain how to perform manufacturer-specific installation procedures
- Peripheral Devices
- Explain Modem technology and standards, and demonstrate the installation and configuration of a modem
- Demonstrate how to install and use soundcards
- Describe the basic features of video monitors and safety aspects
- Compare the different printer technologies used in PCs
- Describe scanner technology, installation, and operation
- Describe digital camera operation and interfacing with PCs
- Compare the MPEG standards for Digital Video
- Explain keyboard theory
- Ports
- Define the RS232c standard for serial ports and its purposes
- Describe the SPP, EPP and ECP Parallel ports
- Compare the USB ver1.1 and ver2.0 transfer rates and intended uses
- Explain IEEE 1394 Firewire (i.Link) operation; state transfer rates and intended uses
- Describe PS/2 ports and their purpose
- Explain how infrared communications takes place in PCs
- Describe Game/Midi ports
- Explain how to identify various ports by their connectors on a PC
- Power Supplies
- Compare the usage and capabilities of AT, ATX, ATX12V power supplies
- Demonstrate how to identify AT, ATX, and ATX12V power supplies
- List the major differences between AT, ATX and ATX12V
- Explain the removal and installation procedures for expansion cards in ATX and ATX12V systems
- Explain the purposes of a UPS (uninterruptible power supplies)
- Describe PC power supply troubleshooting procedures
- 9.0 Basic Networking Concepts
- Demonstrate the proper installation and configuration of a NIC (Network Interface Card)
- Explain why TCP/IP Protocol is widely used and the configuration process
- Topologies
- Explain and draw a diagram of a “Star” topology network
- Explain and draw a diagram of a “Ring” topology network
- Explain and draw a diagram of a “Bus” topology network
- Networking Technologies
- Describe Ethernet Technology and its method of data transmission
- Describe Token Ring Technology and its method of data transmission
- Cabling
- Define 10/100BaseT (twisted pair) and describe its usage
- Compare 10Base2 (thinnet) and 10Base5 (thicknet) coaxial cabling systems for the Bus topology
- Describe the design difference between a crossover cable and a straight through cable.
- Compare the advantages of using fiber optic cabling
- List the harmful effects of EMI (electromagnetic interference)
- Describe methods of troubleshooting cabling systems
- Describe the principles of data integrity and protection
- Explain the basics of Network Operating Systems (NOS)
- Explain how Directory/File/Drive Sharing is accomplished
- Portables
- Explain the technology and advantages of LCD displays

- Describe precautions and usage of batteries in laptop PCs
- Explain common power management techniques
- Describe PCMCIA card types and their uses
- Digital Concepts
- Define baseband and compare the term with broadband
- Explain how DAC's and ADC's convert Digital to Analog and Analog to Digital Describe interfacing connectors and how both analog and digital data are processed
- Describe and convert Binary, Octal, and Hexadecimal numbering systems
- Troubleshooting/Preventive Maintenance
- Explain how to distinguish hardware from software issues
- Explain the functions of PC test equipment
- List utility software that technicians should be familiar with (Scandisk, Defragmentation, OEM specific utilities, etc.)
- List static safety procedures and static causes and effects
- Describe the function of virus scanners and their methods
- Describe the usage of Adware and Spyware
- Demonstrate the ability to document and record a computer repair
- Demonstrate the use of POST diagnostic cards for troubleshooting
- List environmental problems common to PCs (temp, dust and dirt, smoke, etc.)
- Operating Systems (Windows 98, XP, 2000, ME)
- Demonstrate the use of Basic Disk & File Management commands
- Demonstrate the use of basic troubleshooting commands (such as Fdisk, Format, Sys, Xcopy, etc.)
- Explain the use of Command Switches
- Demonstrate Win98/ME, familiarity
- Demonstrate Windows XP familiarity
- Perform common functions of Windows Desktop
- Demonstrate the use of Windows Explorer for file and folder management
- Demonstrate the use of Windows Device Manager for installing and troubleshooting hardware
- Explain Windows Registry Management as it pertains to editing, backup, and restoration
- Define purposes and usage of Virtual Memory and display the ability to adjust Virtual Memory settings
- Explain the common steps in configuring Windows
- Explain the purposes and usage of Msconfig.exe (Win98/ME, XP)
- Describe the purpose of and how System Restore is used (Win ME, XP)
- Describe Software Uninstall Procedures for Windows Applications
- Demonstrate the use of Linux File Management commands
- File Management
- Explain the differences and advantages of FAT16, FAT32, NTFS,
- Explain how MBR and DOS boot records are used
- Demonstrate the ability to partition a given hard drive and explain the types of partitions and their usage
- Explain the procedures for directory (folder) creation and deletion
- Demonstrate file usage (saving, deleting, copying, moving, recovery)
- Describe the defragmentation process, how it is accomplished, and how often to use it
- Describe how the Data Backup process works and compare the various types of backups
- Utility Software
- List the applications of MS-Office 2000/2003
- Explain how performance Utilities/Diagnostics (such as Norton or McAfee) are used
- Describe the usage of PCAnywhere and Laplink
- Safety Procedures/Handling
- Demonstrate proper use of ESD equipment (bench pads, straps, etc.)
- Explain precautions when handling components
- Explain why components must be stored in anti-static packaging
- Workplace Practices
- Demonstrate ability to use parts procurement resources, references and databases
- Describe good and bad work bench housekeeping – area safety & efficiency, and first aid
- Explain important concepts in warranty claims handling and billing procedures
- Describe potential hazards in both shop and in-home environments

LAB LEARNING OUTCOMES:

- Disassemble and reassemble a computer
- Load and configure an operating system
- Load and configure system drivers

- Troubleshoot and repair hardware failures
- Troubleshoot and repair software failures
- Network computers in a workgroup