

Course Description

This course is designed to help students learn how to maintain, upgrade, repair desktop and laptop computers. Students will also learn how to optimize their computer for maximum performance. The course will help students pass industry neutral certifications exams.

This course is being designed to help wounded veterans who served in Iraq and Afghanistan. Please visit the Wounded Warrior Project web site and donate what you can.

<http://www.woundedwarriorproject.org/>

Donations:

<https://www.kintera.org/AutoGen/Simple/Donor.asp?ievent=251282>

Creative Commons License

You are free to:

- **to Share** — to copy, distribute and transmit the work
- **to Remix** — to adapt the work

Under the following conditions:

- **Attribution** — You must attribute the work in the manner specified by the author or licensor (but not in any way that suggests that they endorse you or your use of the work).
- **Noncommercial** — You may not use this work for commercial purposes.
- **Share Alike** — If you alter, transform, or build upon this work, you may distribute the resulting work only under the same or similar license to this one.

With the understanding that:

- **Waiver** — Any of the above conditions can be [waived](#) if you get permission from the copyright holder.
- **Other Rights** — In no way are any of the following rights affected by the license:
 - Your fair dealing or [fair use](#) rights;
 - Apart from the remix rights granted under this license, the author's [moral](#) rights;
 - Rights other persons may have either in the work itself or in how the work is used, such as [publicity](#) or privacy rights.
- **Notice** — For any reuse or distribution, you must make clear to others the license terms of this work. The best way to do this is with a link to this web page.

<http://creativecommons.org/licenses/by-nc-sa/3.0/us/>

Subject Matter Experts

The following SME's have added their expertise to this project.

- Eman Alani
- David Raney
- Anthony Radzykewycz
- Aaron Simms
- Richard Willis

Unit I – Hardware

Chapter	Content
1.	Introduction to Computer Hardware Motherboards <ol style="list-style-type: none">Form FactorsComputer Cases
2.	BIOS and CMOS <ol style="list-style-type: none">BIOSCMOSPower-on Self Test (POST)Extensible Firmware Interface (EFI)
3.	CPUs <ol style="list-style-type: none">Processor ComponentsCache Memory: L1, L2, L3Processor Buses: FSB and BSBMultiprocessing, Hyper-Threading, Multiple Processors/CoresProcessor SocketsSocket Types: PGA, SPGA, LGAOverclocking and ThrottlingAMD and Intel CPU families
4.	Cooling Devices <ol style="list-style-type: none">Heat SinksThermal GreaseFansLiquid Cooling Systems
5.	RAM <ol style="list-style-type: none">SRAMDRAMMemory Modules<ol style="list-style-type: none">DIMMSSDRAM/DDR/DDR2/DDR3DDR Pins and VoltagesInstalling RAMRIMMs and DIMMsSO-DIMMsDIMM Speed RatingsCAS Latency and RAS LatencyRegistered and Buffered DIMMsChannelsError Checking and Parity<ol style="list-style-type: none">Error-correcting code (ECC)Parity

6. Bus Slots
 - a. PCI
 - b. PCIe
 - c. AGP
 - d. CNR

7. Chipsets
 - a. Northbridge
 - b. Southbridge

8. Power Supply Units (PSUs)
 - a. AC in CD out
 - b. ATX
 - c. Wattage
 - d. Connector Types (20 and 24)
 - e. Output Voltage
 - f. Advanced Configuration and Power Interface (ACPI)

9. Input / Output Ports
 - a. Audio: AC 97 & HD
 - b. USB 1.1, 2.0, 3.0
 - c. Serial
 - d. Firewire/1394
 - e. Parallel
 - f. PS2
 - g. Optical
 - h. NIC, Ethernet

10. Hard Drives
 - a. Magnetic
 - b. SSD Drives
 - c. Tracks/Sectors/MBR

11. Hard Driver Interface Standards
 - a. SATA
 - b. PATA: IDE/EIDE
 - c. RAID
 - d. SCSI
 - e. Serial Attached SCSI (SAS)

12. Optical Drives
 - a. CD
 - b. CD-RW
 - c. Blue-Ray

13. Removable Storage
 - a. Hot Swappable
 - b. Flash Drives
 - c. External USB Devices
 - d. SD Cards
 - e. Safe removable of peripherals

14. Video Displays
 - a. LCDs
 - b. Resolution

- c. Refresh Rate
 - d. Multi-monitor
 - e. Backlighting, florescent - LED
15. Video Connectors
- a. VGA
 - b. HDMI
 - c. DVI
 - d. Component RGB
 - e. S-Video
16. Input Devices
- a. Keyboards
 - b. Mouse
 - c. Biometric
 - d. Graphic Tablets
 - e. Web Cams
17. Printers
- a. Inkjet Printers
 - b. Laser Printers
 - c. Local vs. Network Printers
18. Laptops
- a. SODIMM
 - b. PC cards/PCMCIA
 - c. Touch Pads
 - d. Cellular WAN
 - e. IR
 - f. Bluetooth
 - g. Batteries
 - h. Docking Stations

Unit II – Operating Systems

Chapter	Content
1.	Introduction to Operating Systems The Boot Process/POST
2.	Files Systems <ol style="list-style-type: none">Fat 32NTFSWindows ExplorerCreating FoldersNavigating directoriesInstalling the OS
3.	Files <ol style="list-style-type: none">CreatingExtensionsAttributesPermissions
4.	Exploring the Windows Environment <ol style="list-style-type: none">My DocumentsMy ComputerMy Network PlacesWindows ExplorerStart MenuControl Panel (Category and Classic View)MMCTask Menu
5.	Command Line Utilities <ol style="list-style-type: none">cmdMsconfigMsiinfo32DxdiagRegedit
6.	Installation Methods <ol style="list-style-type: none">Boot media, CD or USBNetwork InstallationInstall from an Image
7.	Installation Options <ol style="list-style-type: none">File System TypesNetwork ConfigurationsPartitioningFormat the Hard DriveStart Installation
8.	Recovery Options <ol style="list-style-type: none">Safe ModeRestore PointsAutomated System Recovery (ASR)Emergency Repair Disk (ERD)Factory Recovery Partitions

- f. Repair Installation
- 9. Windows Operating Systems
 - a. Windows 2K
 - b. Windows XP
 - c. Windows Vista
 - d. Windows System 7
 - e. Windows Server 2003
 - f. Windows Server 2008
- 10. The Macintosh OS
 - a. Based on Unix
- 11. Unix/Linux
 - a. Open Source

Unit III – Networking and Security

Chapter	Content
1.	Introduction Cabling <ul style="list-style-type: none">a. UTP (Cat 3, Cat5e, Cat6)b. STPc. Fiberd. Coaxe. RJ-45/RJ-11 Connectorsf. Cable Managementg. Bandwidthh. Bits/sec (Mbps)i. Full and Half Duplex
2.	Network Card Settings <ul style="list-style-type: none">a. TCP/IPb. DHCPc. DNSd. Gatewaye. Subnet Maskf. NetBIOS
3.	Network Technologies <ul style="list-style-type: none">a. Ethernet (802.3)b. Virtual Private Networks (VPN)
4.	Network Ports <ul style="list-style-type: none">a. HTTP and HTTPSb. FTPc. SMTPd. POPe. Telnet
5.	Network Topologies <ul style="list-style-type: none">a. Starb. Busc. Ringd. Mesh
6.	Network Configurations <ul style="list-style-type: none">a. LANsb. WANsc. MANs
7.	Network Devices <ul style="list-style-type: none">a. Hubsb. Switchesc. Routersd. Hardware Firewalls
8.	Accessing the Internet <ul style="list-style-type: none">a. DSLb. Cablec. Fiber

- d. Satellite
 - e. Dial-up
9. Wireless Technologies
- a. Ethernet 802.11
 - b. Bluetooth
 - c. Cellular
 - d. Infrared
 - e.
10. Securing Wireless Networks
- a. Encryption (WEP and WPA)
 - b. SSID
 - c. Mac Filtering
11. Malicious Software
- a. Virus
 - b. Trojans
 - c. Worms
 - d. Spam
 - e. Spyware
 - f. Adware
 - g. Grayware
 - h. BIOS Security
12. Hardening Computers from Attack
- a. Passwords
 - b. Usernames
 - c. Social Engineering
 - d. Intrusion Detection Systems (IDS)
 - e. BIOS Security
 - f. Trusted Platform Module (TPM) encrypted password login
 - g. Physical Security
 - i. Computer Room Security
 - ii. Locks
 - iii. Smart Cards
 - iv. Biometrics
 - h. Data Wiping/Hard Drive Destruction

Unit IV – Operations and Troubleshooting

Chapter	Content
1.	Introduction Electronic Equipment Issues <ol style="list-style-type: none">Wrist StrapsESDEMI: Network interference and MagnetsRFI: Cordless phones and microwavesLint-free clothComputer vacuums and compress air
2.	Working Safely <ol style="list-style-type: none">Material Safety Data Sheets (MSDS)Disposal ProceduresWorking with High Voltage Devices<ol style="list-style-type: none">CRTsPower SuppliesLaser PrintersInvertersPhysical Safety<ol style="list-style-type: none">Heavy DevicesHot Components
3.	Power Management <ol style="list-style-type: none">SuspendHibernateStandbyWake on LANSleep TimersResume last state on power restore
4.	Preventive Maintenance <ol style="list-style-type: none">DefragChkdskClean diskUpdates: drivers, OS, and AppsService PacksCleaning MonitorsCleaning computer cases; Compressed Air and vacuums
5.	Troubleshooting Steps <ol style="list-style-type: none">Identify the ProblemCheck the obviousDevelop a theoryCreate a PlanVerify the solutionDocument the issue
6.	Common Computer Problems <ol style="list-style-type: none">Won't boot (NTLDR, invalid boot disk, blue screen)No videoSystem lockupsSystem is slowHeat problems

- f. Status LEDs
- 7. Troubleshooting Laptops
 - a. Batteries
 - b. LCD screens (back light and inverter)
 - c. Hard Drives
 - d. Wifi
- 8. Troubleshooting Networks
 - a. Ping
 - b. Tracert
 - c. NSlookup
 - d. ipconfig
 - e. Telnet/SSH
 - f. Loopback/Localhost
- 9. Printing Problems
 - g. Setting printer properties
 - h. Test print page
 - i. Managing the Print Queue
 - j. Print driver updates
- 10. The Recovery Console
 - a. Attrib
 - b. Chkdsk
 - c. Diskpart
 - d. Fixboot
 - e. Fixmbr
 - f. Format
 - g. Xcopy
- 11. Professionalism
 - a. Positive Attitude
 - b. Language: avoid jargon, acronyms, slang
 - c. Cultural Sensitive
 - d. Listen, do not interrupt, the customer
 - e. Be on time, contact the customer if late
 - f. Avoid personal calls and talking to coworkers
 - g. Dealing with Difficult customers
 - h. Clarify customers statements
 - i. ask open-ended questions
 - ii. restate issues to verify
 - i. Set and meet expectations
 - j. Handling confidential customer materials