

BAVTS Computer Networking



Course Title/Number: CIP 11.0901

Computer Networking & Telecommunications

Year: 2019-2020

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Additional Staff working with our class:

Mr. Craig Mosser, *Computer Integration Lab Specialist*

Ms. Cindy Carson, *CIL Instructional Assistant*

Mr. Chris Bosch, *Literacy Specialist*

Ms. Vicki Ciavaglia, *Math Specialist*

Textbooks:

A+ Guide to IT Technical Support (9th Edition) - Jean Andrews | Joy Dark | Jill West

ISBN: 978-1-305-26643-8

Lab Manual for A+ Guide to IT Technical Support (9th Edition) - Jean Andrews | Joy Dark | Jill West

ISBN: 978-1-305-26654-4

Computer Networking & Telecommunications



Course Description:

This 3 year instructional program focuses on design, implementation and management of linked systems of computers, peripherals and associated software, preparing students with the technical skills required to support networks and network users. This program includes technical skills required to support networks, and network users. This program includes instruction in network technologies and standards; system design, architecture, operating systems, security, communications protocols, client support, messaging services, network management, troubleshooting, and server optimization. Those completing the program may be employed as a network administrator, network specialist, network technician, webmaster, client services analyst (end user) or network operator.

Average pay: <https://www.careerlinkhighvalley.org/Portals/1/PDF%20Files/2018%20LV%20HPO.pdf>

- SOC Code: 15-1134 Web Developers - \$72,030
- SOC Code: 15-1142 Networking & Computers - \$77,700

IN DEMAND CAREERS: IT Help Desk, IT Support, IT Services Management, Human Resources, IT System Architect, IT Enterprise Architect, Cybersecurity Engineer, Cybersecurity Analyst, Network Engineer, Network Architect, Cybersecurity Manager, Cybersecurity Administrator, Systems Engineer, Software Developer, Software Engineer, Vulnerability Analyst, Penetration Tester, Systems Administrator, IT Auditor

Classroom Tools:

- IT Computer Technician Tool Kit
 - 3 way ratchet driver
 - Mini combination screwdriver
 - Cable crimper
 - ESD strap
 - ESD mat
- Desktop Computers
- Laptop Computers
- PC Building Simulators
- Code HS
- TestOut - Labsim

Course Syllabus



Year One - Marking Period One

Personal and Environmental Safety

Duty and Tasks Covered:

- 101 List common causes of accidents and injuries in a computer facility.
- 102 Wear personal protective equipment.
- 104 Review Safety Data Sheets (SDS) and explain their requirements in handling hazardous materials.
- 105 Describe types of fire extinguishers and explain which types to use for extinguishing various fires.
- 106 Demonstrate safe procedures to follow when lifting and carrying heavy objects.
- 107 Describe the importance of safety as it relates to environmental issues.
- 108 Identify potential hazards when working with power supplies.
- 109 Identify proper disposal procedures for batteries and display devices.
- 110 Identify proper disposal procedures for chemical solvents and pressurized cans.
- 111 Identify and prevent Electro Static Discharge conditions.
- 114 Maintaining a safe work area to avoid common accidents and injuries.
- 103 List and identify safety hazard symbols.
- 112 Describe the meaning and importance of the Energy Star Rating System.

Year One - Marking Period 2

Computer Hardware

Duty and Tasks Covered:

- 202 Categorize the different types of computer cases.
- 203 Explain motherboard components, types and features.
- 205 Explain the purpose and characteristics of CPUs and their features.
- 207 Compare and contrast memory types, characteristics and their purpose.
- 204 Categorize power supplies types and features.
- 206 Explain cooling methods and devices.
- 213 Given a scenario, install, configure and maintain personal computer components.
- 214 Given a scenario, detect problems, troubleshoot, and repair/replace desktop and laptop computer components.
- 201 Categorize storage devices and backup media.
- 211 Install, configure and optimize laptop components and features.
- 208 Distinguish between the different display devices and their characteristics.
- 209 Summarize the function and types of adapter cards.
- 210 Install and configure peripherals and input devices.



Year One - Marking Period 3

Troubleshooting, Repair and Maintenance

Duty and Tasks Covered:

304 Describe and interpret common laptop issues and determine the appropriate basic troubleshooting method.

305 Given a scenario, integrate common preventative maintenance techniques.

Year One - Marking Period 4

Operating Systems and Software

Duty and Tasks Covered:

402 Given a scenario, demonstrate proper use of user interfaces.

403 Explain the process and steps to install and configure an operating system.

405 Select the appropriate commands and options to troubleshoot and resolve problems.

406 Differentiate between various operating system directory structures.

Year 1 Knowledge/Projects

- MSDS Tools Used Project
- How to Build a PC PowerPoint
- How to Build a PC Presentation
- Desktop vs Laptop Disassembly Project
- Troubleshooting Practical Lab.
- Timed Disassembly - Performed Monthly
- Chapter 1 Lab Projects
- Chapter 2 Lab Projects
- Chapter 3 Lab Projects
- Chapter 4 Lab Projects
- Chapter 5 Lab Projects
- Chapter 6 Lab Projects
- Chapter 1 Test
- Chapter 2 Test
- Chapter 3 Test
- Chapter 4 Test
- Chapter 5 Test
- Chapter 6 Test



Year Two - Marking Period One

Computer Hardware

Duty and Tasks Covered:

212 Install and configure printers.

215 Given a scenario, diagnose and repair common printer issues.

Year Two - Marking Period One

Troubleshooting, Repair and Maintenance

Duty and Tasks Covered:

407 Identify and use system utilities/tools and evaluate the results.

408 Evaluate and resolve common OS and software issues.

404 Explain the basics of boot sequences, methods and startup utilities.

409 Explain the administration of local users, groups and institute local security policy.

410 Compare and contrast a network operating system (NOS) with a workstation operating system (OS).

401 Compare and contrast the different operating systems and their features.

Year Two - Marking Period Two

Network Technologies

Duty and Tasks Covered:

501 Explain the function of common networking protocols, such as FTP, TCP/IP suite, DHCP, DNS, etc.

503 Identify the following address formats, including IPv6, IPv4, MAC addressing.

507 Compare the characteristics of wireless communication standards, including 802.11 standards: speeds, distance, channels, frequency, authentication and encryption.

Year Two - Marking Period Three & Four

Network Media and Topologies

Duty and Tasks Covered:

602 Identify common connector types, including UTP, STP, coaxial, and fiber.

604 Given a scenario, differentiate and implement appropriate wiring standards, including 568A, 568B, and loopback.

605 Categorize common WAN technology types and properties.

Year 2 Knowledge/Projects

- Operating Systems (Win 7 vs Win 8) PowerPoint
- Operating Systems (Win 7 vs Win 8) Presentation
- File Explorer Project
- Thermaltake Case Project
- Solving OS Issues Project
- IP Address Project (IPv4 vs IPv6)
- Making an Ethernet Cable - Performed Monthly
- Chapter 7 Lab Projects
- Chapter 8 Lab Projects

- Chapter 9 Lab Projects
- Chapter10 Lab Projects
- Chapter 11 Lab Projects
- Chapter 12 Lab Projects
- Chapter 13 Lab Projects
- Chapter 14 Lab Projects
- Chapter 15 Lab Projects
- Chapter 16 Lab Projects
- Chapter 7 Test
- Chapter 8 Test
- Chapter 9 Test
- Chapter10 Test
- Chapter 11 Test
- Chapter 12 Test
- Chapter 13 Test
- Chapter 14 Test
- Chapter 15 Test
- Chapter 16 Test





Year Three - Marking Period One

Network Technologies

Duty and Tasks Covered:

503 Identify the following address formats, including IPv6, IPv4, MAC addressing.

504 Given a scenario, evaluate the proper use of addressing technologies and addressing schemes, including: subnetting: classful vs. classless, NAT, PAT, SNAT, public vs. private, DHCP, addressing schemes: unicast, multicast, broadcast, etc.

505 Identify common IPv4 and IPv6 routing protocols, including link state, distance vector, and hybrid protocols.

506 Explain the purpose and properties of routing, including IGP vs EGP, static vs. dynamic, next hop, interpret routing tables and how they pertain to path selection, explain convergence (steady state).

501 Explain the function of common networking protocols, such as FTP, TCP/IP suite, DHCP, DNS, etc.

502 Identify commonly used TCP and UDP default ports, including TCP ports: FTP -20, 21, SSH - 22, TELNET - 23, HTTP - 80, etc.

507 Compare the characteristics of wireless communication standards, including 802.11 standards: speeds, distance, channels, frequency, authentication and encryption.

Year Three - Marking Period One

Network Media and Topologies

Duty and Tasks Covered:

601 Categorize standard cable types and their properties, including: UTP, STP, coaxial, fiber; plenum vs. non-plenum properties: transmission speeds, distance, duplex, noise immunity, frequency.

602 Identify common connector types, including UTP, STP, coaxial, and fiber.

603 Identify common physical network topologies.

604 Given a scenario, differentiate and implement appropriate wiring standards, including 568A, 568B, and loopback.

606 Categorize common LAN technology types and ethernet properties: CSMA/CD, broadcast, collision, bonding, speed, distance.

608 Install components of wiring distribution, including vertical and horizontal cross connects, verify installation and termination.

607 Explain common logical network topologies and their characteristics, including peer to peer and client/server.

605 Categorize common WAN technology types and properties.

Year Three - Marking Period Two

Network Devices

Duty and Tasks Covered:

701 Install, configure and differentiate between common network connectivity devices.

702 Identify the functions of specialized network devices such as, multilayer switch, content switch, IDS/IPS, load balancer, multifunction network devices, DNS server, bandwidth shaper, proxy server, CSU/DSU.

703 Explain the advanced features of a switch such as, PoE, spanning tree, VLAN, trunking, port mirroring, port authentication, etc.

704 Implement a basic wireless network, including client configuration, access point placement and installation.

705 Configure appropriate encryption, configure channels and frequencies, set ESSID and beacon, verify installation.



Year Three - Marking Period Two

Network Management

Duty and Tasks Covered:

801 Explain, compare and contrast the layers of the TCP/IP and OSI models.

802 Identify types of configuration management documentation such as, wiring schematics, physical and logical network diagrams, baselines, policies, procedures and configurations, regulations.

803 Evaluate the network based on configuration management documentation; such as: wiring schematics; physical and logical network diagrams; baselines; policies, procedures, and configurations to network devices and infrastructure; wiring schematics; physical and logical network diagrams; and, configurations and job logs as needed.

804 Conduct network monitoring to identify performance and connectivity issues such as, packet sniffers, connectivity software, load testing, throughput testers, system logs, history logs, event logs.

805 Perform network optimization.

Year Three - Marking Period Three

Network Tools and Troubleshooting

Duty and Tasks Covered:

903 Select the appropriate hardware tools such as, cable testers, protocol analyzer, certifiers, TDR, OTDR, multimeter, toner probe, butt set, punch down tool, cable stripper, snips, voltage event recorder, temperature monitor.

902 Use network scanners such as, packet sniffers, intrusion detection software, Intrusion prevention software, port scanners.

901 Select the appropriate command line/graphical tools and interpret the output to verify functionality such as, Traceroute, Ipconfig, Ifconfig, Ping, Arp ping, Arp, Nslookup, Hostname, Dig, Mtr, Route, Nbtstat, Netstat.

904 Implement network troubleshooting methodologies, including Information gathering – identify symptoms and problems, Identify the affected areas of the network.

905 Describe and create an action plan and solution identifying potential effects, implement and test the solution, identify the results and effects of the solution, document the solution and the entire process.

906 Troubleshoot common wired and wireless connectivity issues and select an appropriate solution to include physical and logical issues.

Year Three - Marking Period Four

Security Fundamentals

Duty and Tasks Covered:

1004 Differentiate the principals of user authentication such as, PKI, Kerberos, AAA: RADIUS, TACACS+, network access control: 802.1x, CHAP, MS-CHAP, EAP.

1005 Evaluate issues that affect device security such as, physical security and network access.

1003 Configure network access security such as, ACL: MAC filtering, IP filtering tunneling and encryption: SSL VPN, VPN, L2TP, PPTP and related others.

1001 Configure hardware and software security devices such as, network based firewall, host based firewall, DMZ, IDS, IPS, VPN concentrator.

1002 Implement features of a network firewall such as, application layer vs. network layer, stateful vs. stateless, scanning services, content filtering, signature identification, zones.

1006 Identify and mitigate common security threats.

1007 Demonstrate security features including BIOS security, password management, locking workstations, and biometrics.



Year 3 Knowledge/Projects

- Building a Network Project
- Creating a Subnetting Map Project
- Routing Protocol Project
- Chapter 17 Lab Projects
- Chapter 18 Lab Projects
- Chapter 19 Lab Projects
- Chapter 20 Lab Projects
- Chapter 17 Test
- Chapter 18 Test
- Chapter 19 Test
- Chapter 20 Test

Supplemental Learning Activities



Students who participate in this program will also have opportunities to participate in the following programs and school-sponsored activities:

SkillsUSA: SkillsUSA is a national membership association serving high school, college and middle school students who are preparing for careers in trade, technical and skilled service occupations, including information technology occupations, and for further education. SkillsUSA is a partnership of students, teachers and industry working together to ensure America has a skilled workforce. SkillsUSA helps each student excel. Computer Networking students compete in various areas.

NTHS: Level II and Level III students who have received an “A” in their career and technical program as well as a “B” average at their sending school are eligible to become a member of the BAVTS Chapter of the National Technical Honor Society.

Cooperative Education: Students who have attended six quarters in their career and technical programs are eligible to participate in a paid work experience during the PM session of BAVTS. Positions must be available and the students must be recommended by the CTE teacher to be eligible.

Job Shadowing: Students are eligible to visit business and industry partners for one or more days to view the day-to-day operations of this career area.

Internships: Students who have completed six or more quarters of their CTE program are eligible to work for a business and industry partners with the recommendation of the instructor and the availability of assignment.

Field Trips: Students in this program will attend field trips that expose them to educational experiences within the career field.

Industry Certifications

CareerSafe is a certification that delivers Safety Education for America’s Future. It is offered to advance and enhance OSHA’s outreach by providing every young worker with workplace safety training prior to taking their first job. CareerSafe offers affordable, informative and innovative online safety training to reach as many young workers as possible.

NOCTI is a certification that provides a credible means of verifying the knowledge and skills expected by industry -- from those involved in establishing the Workforce Competency Credential benchmark to the hundreds of employers that trust NOCTI and Nocti Business Solutions with their assessment programs.

TestOut PC Pro: Many IT professionals begin their careers in IT support-related positions. The main purpose of the TestOut PC Pro certification is to verify necessary skills to work as an IT support professional. In an IT support job, you’ll be asked to install, repair, configure, secure, and manage computer hardware, operating systems, and software in home or corporate environments. These are the most basic and foundational skills

required of all IT professionals. Additionally, communication, listening and analysis skills are essentials for interacting with customers.

TestOut Network Pro certification measures an examinee's ability to perform tasks commonly performed by IT network professionals, including systems administrators, network administrators, network engineers and related careers. The core responsibilities of these job roles typically revolve around the management of hardware and software networking components and include IP configuration, setting up wireless and wired networks, managing networks, basic network security, software updates, hardware upgrades and network protocols. IT network professionals must also master fundamental computer support and maintenance which are covered in TestOut's PC Pro certification exam.

CompTIA A+ (A Plus) is an entry-level computer certification for PC computer service technicians. The exam is designed to certify the competency of entry-level PC computer service professionals in installing, maintaining, customizing, and operating personal computers. The A+ certification is sponsored by the Computing Technology Industry Association (CompTIA).

CompTIA Network+ (Network Plus) is a mid-level certification for network technicians. This certification is designed to test the competency of a mid-level network technician in supporting and configuring TCP/IP clients in terms of network design, cabling, hardware setup, configuration, installation, support, and troubleshooting.

CompTIA Security+ (Security Plus) is a global certification that validates the baseline skills you need to perform core security functions and pursue an IT security career.

