Network Administration

ACADEMIC SKILLS

AA SPEAKING AND LISTENING

AA1 Utilize effective verbal and non-verbal communication skills

AA2 Participate in conversation, discussion, and group presentations

AA3 Communicate and follow directions/procedures

AA4 Communicate effectively with customers and co-workers

AB READING AND WRITING

AB1 Locate and interpret written information

AB2 Read and interpret workplace documents

AB3 Identify relevant details, facts, and specifications

AB4 Record information accurately and completely

AB5 Demonstrate competence in organizing, writing, and editing using correct vocabulary, spelling, grammar, and punctuation

AB6 Demonstrate the ability to write clearly and concisely using industry specific terminology

AC CRITICAL THINKING AND PROBLEM SOLVING

AC1 Utilize critical-thinking skills to determine best options/outcomes (e.g., analyze reliable/unreliable sources of information, use previous experiences, implement crisis management, develop contingency planning)

AC2 Utilize innovation and problem-solving skills to arrive at the best solution for current situation

AC3 Implement effective decision-making skills

AD MATHEMATICS

AD1 Perform basic and higher level math operations (e.g., addition, subtraction, multiplication, division, decimals, fractions, units of conversion, averaging, percentage, proportion, ratios)

AD2 Solve problems using measurement skills (e.g., distance, weight, area, volume)

AD3 Make reasonable estimates
AD4 Use tables, graphs, diagrams, and charts to obtain or convey information

AD5 Use deductive reasoning and problem-solving in mathematics

**AE FINANCIAL LITERACY**

AE1 Locate, evaluate, and apply personal financial information

AE2 Identify the components of a budget and how one is created

AE3 Set personal financial goals and develop a plan for achieving them

AE4 Use financial services effectively

AE5 Demonstrate ability to meet financial obligations

**AF INTERNET USE AND SECURITY**

AF1 Recognize the potential risks associated with Internet use

AF2 Identify and apply Internet security practices (e.g., password security, login, logout, log off, lock computer)

AF3 Practice safe, legal, and responsible use of technology in the workplace

**AG INFORMATION TECHNOLOGY**

AG1 Use technology appropriately to enhance professional presentations

AG2 Demonstrate effective and appropriate use of social media

AG3 Identify ways social media can be used as marketing, advertising, and data gathering tools

**AH TELECOMMUNICATIONS**

AH1 Select and use appropriate devices, services, and applications to complete workplace tasks

AH2 Demonstrate appropriate etiquette when using e-communications (e.g., cell phone, e-mail, personal digital assistants, online meetings, conference calls)
EMPLOYABILITY SKILLS

EA POSITIVE WORK ETHIC

EA1 Demonstrate enthusiasm and confidence about work and learning new tasks
EA2 Demonstrate consistent and punctual attendance
EA3 Demonstrate initiative in assuming tasks
EA4 Exhibit dependability in the workplace
EA5 Take and provide direction in the workplace
EA6 Accept responsibility for personal decisions and actions

EB INTEGRITY

EB1 Abide by workplace policies and procedures
EB2 Demonstrate honesty and reliability
EB3 Demonstrate ethical characteristics and behaviors
EB4 Maintain confidentiality and integrity of sensitive company information
EB5 Demonstrate loyalty to the company

EC SELF-REPRESENTATION

EC1 Demonstrate appropriate dress and hygiene in the workplace
EC2 Use language and manners suitable for the workplace
EC3 Demonstrate polite and respectful behavior toward others
EC4 Demonstrate personal accountability in the workplace
EC5 Demonstrate pride in work

ED TIME, TASK, AND RESOURCE MANAGEMENT

ED1 Plan and follow a work schedule
ED2 Work with minimal supervision
ED3 Work within budgetary constraints
ED4 Demonstrate ability to stay on task to produce high quality deliverables on time
EE DIVERSITY AWARENESS

EE1 Recognize diversity, discrimination, harassment, and equity

EE2 Work well with all customers and co-worker

EE3 Explain the benefits of diversity within the workplace

EE4 Explain the importance of respect for feelings, values, and beliefs of others

EE5 Identify strategies to bridge cultural/generational differences and use differing perspectives to increase overall quality of work

EE6 Illustrate techniques for eliminating gender bias and stereotyping in the workplace

EE7 Identify ways tasks can be structured to accommodate the diverse needs of workers

EE8 Recognize the challenges and advantages of a global workforce

EF TEAMWORK

EF1 Recognize the characteristics of a team environment and conventional workplace

EF2 Contribute to the success of the team

EF3 Demonstrate effective team skills and evaluate their importance in the workplace (e.g., setting goals, listening, following directions, questioning, dividing work)

EG CREATIVITY AND RESOURCEFULNESS

EG1 Contribute new ideas

EG2 Stimulate ideas by posing questions

EG3 Value varying ideas and opinions

EG4 Locate and verify information

EH CONFLICT RESOLUTION

EH1 Identify conflict resolution skills to enhance productivity and improve workplace relationships

EH2 Implement conflict resolution strategies and problem-solving skills

EH3 Explain the use of documentation and its role as a component of conflict resolution

EI CUSTOMER/CLIENT SERVICE

EI1 Recognize the importance of and demonstrate how to properly acknowledge customers/clients

EI2 Identify and address needs of customers/clients
EI3 Provide helpful, courteous, and knowledgeable service

EI4 Identify appropriate channels of communication with customers/clients (e.g., phone call, face-to-face, e-mail, website)

EI5 Identify techniques to seek and use customer/client feedback to improve company services

EI6 Recognize the relationship between customer/client satisfaction and company success

**EJ ORGANIZATIONS, SYSTEMS, AND CLIMATES**

EJ1 Define profit and evaluate the cost of conducting business

EJ2 Identify "big picture" issues in conducting business

EJ3 Identify role in fulfilling the mission of the workplace

EJ4 Identify the rights of workers (e.g., adult and child labor laws and other equal employment opportunity laws)

EJ5 Recognize the chain of command, organizational flow chart system, and hierarchy of management within an organization

**EK JOB ACQUISITION AND ADVANCEMENT**

EK1 Recognize the importance of maintaining a job and pursuing a career

EK2 Define jobs associated with a specific career path or profession

EK3 Identify and seek various job opportunities (e.g., volunteerism, internships, co-op, part-time/full-time employment)

EK4 Prepare a resume, letter of application, and job application

EK5 Prepare for a job interview (e.g., research company, highlight personal strengths, prepare questions, set-up a mock interview, dress appropriately)

EK6 Participate in a job interview

EK7 Explain the proper procedure for leaving a job

**EL LIFELONG LEARNING**

EL1 Acquire current and emerging industry-related information

EL2 Demonstrate commitment to learning as a life-long process and recognize learning opportunities

EL3 Seek and capitalize on self-improvement opportunities

EL4 Discuss the importance of flexible career planning and career self-management
EL5 Employ leadership skills to achieve workplace objectives (e.g., personal vision, adaptability, change, shared vision)

EL6 Recognize the importance of job performance evaluation and coaching as it relates to career advancement

EL7 Accept and provide constructive criticism

EL8 Describe the impact of the global economy on jobs and careers

EM JOB SPECIFIC TECHNOLOGIES

EM1 Identify the value of new technologies and their impact on driving continuous change and the need for life-long learning

EM2 Research and identify emerging technologies for specific careers

EM3 Select appropriate technological resources to accomplish work

EN HEALTH AND SAFETY

EN1 Assume responsibility for safety of self and others

EN2 Follow safety guidelines in the workplace

EN3 Manage personal health and wellness
OCCUPATIONAL SKILLS

OA COMPUTER LITERACY

OA 1 Demonstrate proficiency in a word processing package
OA 2 Demonstrate proficiency in a spreadsheet package
OA 3 Describe common applications of a database
OA 4 Demonstrate proficiency in a presentation package
OA 5 Send and receive electronic mail
OA 6 Print in landscape and portrait orientations
OA 7 Apply Internet etiquette and safety
OA 8 Explain the differences between a Web browser and a search engine
OA 9 Navigate a World Wide Web browser
OA 10 Identify Internet search engines and their advantages and disadvantages
OA 11 Demonstrate proficiency in the use of the Internet
OA 12 Identify what an operating system is, how it works, and be able to solve common problems
OA 13 Manipulate (e.g., create, copy, cut, paste, move, rename, delete) files and folders to manage and maintain data
OA 14 Discriminate between ethical and unethical uses of computers and information
OA 15 Demonstrate an understanding of copyrights and licensing
OA 16 Demonstrate an awareness of computer security and a basic understanding of ways to protect a computer (e.g., viruses, Trojans, Malware)
OA 17 Explain the impact of computers on society
OA 18 Identify types of computers, platforms, and devices explaining how they process information and how individual computers interact with other computing systems and devices
OA 19 Identify the function of computer hardware components
OA 20 Identify how to maintain computer equipment and solve common problems relating to computer hardware
OA 21 Identify how software and hardware work together to perform computing tasks and how software is developed and upgraded
OA 22 Identify different types of software, general concepts relating to software categories, and the tasks to which each type of software is most suited or not suited

OA 23 Demonstrate the safe and responsible use of resources, office equipment, and machines

OB INFORMATION TECHNOLOGY PROJECT MANAGEMENT

OB 1 Determine client needs
OB 2 Determine the purpose and goals of the project
OB 3 Identify target audience
OB 4 Identify stakeholders and decision makers
OB 5 Define scope of work to meet client requirements
OB 6 Evaluate project requirements
OB 7 Estimate time requirements
OB 8 Create a project plan
OB 9 Estimate project pricing
OB 10 Demonstrate knowledge of project budgeting, scheduling, and control issues related to development and support
OB 11 Identify tools and resources for the job
OB 12 Identify critical milestones
OB 13 Report project status
OB 14 Identify software packages (e.g., MS Project, Freeware, Shareware)

OC COMPUTER MAINTENANCE ESSENTIALS

OC 1 Identify the names, purpose, and characteristics of computer systems and peripheral devices (e.g., motherboards, expansion/adapter cards, processors, cooling systems, memory, storage devices, power supplies, input devices, cables, output devices)

OC 2 Identify the steps to install, configure, optimize, and upgrade personal computer components and peripherals (e.g., internal/external storage devices, display devices, basic input devices, multimedia devices)

OC 3 Identify software tools, diagnostic procedures, and troubleshooting techniques for personal computer systems

OC 4 Identify techniques to perform preventative maintenance on personal computer components
OC 5 Identify the steps to install, configure, upgrade, and support laptops/ portable devices and identify the names, purposes, and characteristics of mobile computer systems

OC 6 Identify the steps to install, configure, optimize, and upgrade the current client operating systems

OC 7 Identify locations, purposes, and characteristics of operating system files

OC 8 Create, view, and manage disks, directories, and files in operating systems

OC 9 Identify tools, diagnostic procedures, and troubleshooting techniques for operating systems

OC 10 Identify the names, purposes, and methods of connection for printer and scanner components and the use of network print services

OC 11 Describe how to install, configure, optimize, troubleshoot, and upgrade printers and scanners

OC 12 Describe basic physical networking connectivity concepts (e.g., cables, connectors, connection types, network devices)

OC 13 Install, configure, and troubleshoot network interfaces and manage wired/wireless connections

OC 14 Recognize the fundamental principles of information technology security (e.g., Desktop, Network, personal devices, VPN)

OC 15 Identify basic network components (e.g., server, switch, router, access point)

OC 16 Identify the fundamental principles of security including smart cards, authentication technologies, malicious software protection, firewalls, file system security, wireless network security, data, and physical security

OC 17 Identify potential safety hazards and take preventative action including proper disposal (e.g., disposal procedures of batteries, display devices, chemical solvents and cans)

OC 18 Convert among decimal, binary, and hexadecimal number systems

OC 19 Access needed information using company and manufacturers' references (e.g., procedural manuals, documentation, standards, work flowcharts, firmware updates, drivers, manufacturers' websites)

**OD ADVANCED COMPUTER MAINTENANCE**

OD 1 Access needed information using company and manufacturer' references (e.g., procedural manuals, documentation, standards, work flowcharts, firmware updates, drivers, manufacturers' websites)

OD 2 Isolate and identify computer problems using visual/audible inspection of components and follow appropriate troubleshooting procedures (e.g., status lights, beep codes, visual inspection of circuitry)

OD 3 Explain appropriate usage for mobile specific communications

OD 4 Identify major components of the LCD in portable devices (e.g., inverter, screen, backlight)

OD 5 Identify the steps to use appropriate tools, diagnostic procedures, and troubleshooting techniques to diagnose power conditions, video, keyboard, pointer, and network connectivity issues in portable
network equipment (e.g., multimeters, anti-static devices, loopback plugs, specialty tools, cleaning products, cable testers)

OD 6 Use command line functions and utilities, including proper syntax, to manage and troubleshoot operating systems (e.g., msconfig, regedit, chkdsk)

OD 7 Locate and use appropriate operating system utilities for troubleshooting and maintenance (e.g., system, disk management tools)

OD 8 Demonstrate ability to recover operating systems

OD 9 Identify and implement basic network components (e.g., server, switch, router, access point)

OD 10 Identify names, purposes, and characteristics of basic IP networks and terminologies (e.g. port identification, usage)

OD 11 Identify the steps to establish network connectivity, wired, and wirelessly for end users, install and configure browsers, create and manage network shares

OD 12 Use command line tools to diagnose and troubleshoot network connection issues

OD 13 Define and explain how to troubleshoot software and data security issues including software firewall issues, wireless client configuration, data/user access, and file system security

OD 14 Define fault tolerance, disaster recovery, and various backup types/backup media (e.g. RAID levels)

**OE OPERATING SYSTEM SUPPORT**

OE 1 Compare and contrast an attended and unattended installation of an operating system

OE 2 Identify the steps to perform post installation configuration (e.g., user configuration, apply service packs)

OE 3 Answer end user questions related to upgrading from a previous version of an operating system

OE 4 Identify and troubleshoot system startup and user logon problems

OE 5 Identify the steps to monitor and analyze system performance

OE 6 Identify the steps to configure and troubleshoot power management

OE 7 Identify the steps to configure support for multiple languages or multiple locations

OE 8 Identify the steps to configure and troubleshoot remote connections

OE 9 Identify the steps to configure and troubleshoot end user systems using remote access

OE 10 Identify and describe how and when to use hard drive imaging as a repair tool

**OF SMALL NETWORK SUPPORT**

OF 1 Plan and install a home or small business network and connect it to the Internet
OF 2 Verify and troubleshoot network and Internet connectivity
OF 3 Share resources such as files and printers among multiple computers
OF 4 Recognize threats to a home network and identify ways to implement security protocols
OF 5 Configure static and/or dynamic IP services through a GUI

OG APPLICATIONS SUPPORT
OG 1 Explain troubleshooting guidelines and tools to support users running applications
OG 2 Explain the importance of system architecture as it relates to troubleshooting applications
OG 3 Troubleshoot application installation and compatibility issues
OG 4 Answer end user questions related to configuring and customizing productivity applications
OG 5 Identify the steps to configure email programs and to access email servers
OG 6 Troubleshoot issues related to personal information management
OG 7 Identify the steps to backup client email
OG 8 Identify the steps to configure and troubleshoot application access on a network

OH GREEN INFORMATION TECHNOLOGY
OH 1 Explain ways to save energy in the server room
OH 2 Explain ways to make the work space more energy efficient
OH 3 Identify benefits of working in a non-traditional work environment

OI NETWORKING FUNDAMENTALS
OI 1 Set up a personal computer on a network to include the operating system, interface cards, and peripheral devices
OI 2 Explain the role and importance of communications and communication protocols in data networks and the Internet in business and everyday activities
OI 3 Recognize and employ basic network infrastructure devices and media (e.g. MDF and IDF)
OI 4 Describe and design addressing and naming schemes at various layers of data networks
OI 5 Describe and compare the protocols, services, and functions provided in the OSI and TCP/IP models and describe how each layer operates in various networks (encapsulation)
OI 6 Explain fundamental Ethernet concepts such as media, services, and operation
OI 7 Utilize common network utilities to verify small network operations and analyze data traffic
OI 8 Demonstrate understanding of basic network structure and physical/logical topologies

OI 9 Describe the characteristics of networking media types and connectors

OI 10 Identify the basic attributes, purposes, and functions of network components including wireless technologies

OI 11 Differentiate between network protocols in terms of routing, addressing schemes, interoperability, and naming conventions

OI 12 Identify the components and structure of IP (Internet Protocol) addressing and the required settings for connections across the Internet including classful address ranges, public/private addressing, and subnet masks

OI 13 Identify the well-known ports associated with commonly used services and protocols

OI 14 Identify the basic characteristics of WAN and remote access technologies

OI 15 Identify common security and authentication protocols

OI 16 Identify basic capabilities of the major network server operating systems

OI 17 Define the basic purposes and capabilities of firewalls, proxy servers, VLANs, extranets, and intranets

OI 18 Define and demonstrate fault tolerance, disaster recovery, and various back-up types/backup media (e.g. data centers and SANS)

OI 19 Identify good practices to ensure network security including antivirus software an authentication mechanisms

OI 20 Use the appropriate TCP/IP utilities to test, validate, and troubleshoot IP connectivity (e.g. Ping, tracenet, IP config, MBstat, Netstat)

OI 21 Use a systematic approach to diagnose a network problem, develop a recommended course of action, and document the solution

**OJ ROUTING PROTOCOLS AND CONCEPTS**

OJ 1 Describe and explain how the router discovers and selects a path taken by packets through the network

OJ 2 Describe and explain the purpose, nature, and operations of a router

OJ 3 Configure and verify basic operations for a newly installed router to include static and default routing, and distance-vector routing protocols

OJ 4 Describe the basic features and concepts of link-state routing protocols

OJ 5 Identify and troubleshoot errors that occur in small routed networks
OK SMALL TO MEDIUM BUSINESS OR ISP NETWORKING

OK 1 Describe the structure of the Internet and how Internet communications occur between hosts

OK 2 Identify basic WAN connectivity to telecommunications services (e.g. ISDN, POP, T1)

OK 3 Monitor network performance, isolate and repair failures

OK 4 Troubleshoot problems using an organized layered procedure

OL LAN SWITCHING AND WIRELESS

OL 1 Identify and correct common network problems at OSI layers 1, 2, 3, and 7 using a layered model approach

OL 2 Interpret network diagrams including selection of appropriate infrastructure materials

OL 3 Explain the technology and media access control method for Ethernet networks

OL 4 Use the command line interface and utilities to troubleshoot common errors that occur in switched networks

OL 5 Describe standards associated with wireless media, such as IEEE Wi-Fi Alliance, ITU/FCC, A, B, G, N standards

OL 6 Identify and describe the purpose and configuration of the components in a small wireless network, such as Service Set Identification (SSID), Basic Service Set (BSS), Extended Service Set (ESS), and Wireless Adapter Models

OL 7 Compare and contrast Wi-Fi Protected Access (WPA) security features and capabilities of open, Wired Equivalent Privacy (WEP), and WPA-1/2 networks

OM INDUSTRY CERTIFICATION

OM 1 Describe the process and requirements for obtaining industry certification related to networking

OM 2 Demonstrate the ability to successfully complete selected practice examinations and practice questions similar to those on certification exams

OM 3 Identify testing skills/strategies for taking a certification examination

ON CAREER PATHWAYS IN NETWORKING

ON 1 Identify careers in the networking field

ON 2 Search the Internet and other sources for job opportunities

ON 3 Assemble a professional portfolio that contains representative samples of student's work

ON 4 Deliver an oral presentation relating to the professional portfolio
ON 5 Identify potential employment barriers for nontraditional groups and ways to overcome the barriers