

# Network Systems

82MP

This document lists units and competencies addressed by each module.  
For introduced competencies, the addresses descriptors are also listed.

G10: by the end of grade 10    G12: by the end of grade 12

I: Introduced    R: Reinforced    P: Proficient

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## Modules 1 & 2

Unit 1	Information Technology Basics	G10	G12
01.01	Demonstrate basic knowledge of information technology history	P	
01.02	Demonstrate basic knowledge of the information technology impact on society	P	
01.03	Demonstrate knowledge of information technology basics	P	
01.04	Demonstrate knowledge of software associated with information technology	P	
01.05	Evaluate career opportunities in information technology	P	
01.06	Explore the future of information technologies	P	
01.07	Create documents using word processing software	P	
01.08	Create relational databases	P	
01.09	Create spreadsheets	P	
01.10	Create presentations using presentation graphics	P	
01.11	Apply computer office tools	P	
01.12	Demonstrate knowledge of basic data communications components and trends	P	
01.13	Evaluate and access information using electronic sources	P	
01.14	Demonstrate proficiency with electronic mail and instant messaging	P	
01.15	Install/configure software programs	P	
01.16	Demonstrate basic knowledge of the Internet	P	
01.17	Access the Internet	P	
01.18	Utilize Internet services	P	
01.19	Demonstrate knowledge of Web page basics	P	
01.20	Install computer system (e.g., monitor, keyboard, disk drive, and printer)	P	
Number of Items in Module 1 = Number of Minutes to Allow =		36	
Number of Items in Module 2 = Number of Minutes to Allow =		37	

## Modules 3 & 4

Unit 45	Business Law and Legal Issues	G10	G12
45.01	Define intellectual property rights covered by intellectual law		P
45.02	Describe the components of contracts		I
05	Define service level agreements		
08	Explain dispute resolution		
45.03	Identify current regulatory issues (e.g., HIPAA, Gramm-Leach-Bliley, Sarbanes-Oxley, NSA–National Security Act, Homeland Security)		I
01	Explain the impact of regulatory compliance issues on the design and development process		
02	Define/explain the impact of non-compliance to the company/organization		
Unit 46	Technical Writing and Documentation	G10	G12
46.01	Evaluate technical writing requirements		P
46.02	Write technical reports		P
46.03	Conduct technical research		P
46.04	Design technical documentation		P
46.05	Develop technical documentation		P
Unit 48	Basic Business Concepts	G10	G12
48.01	Explain business ownership		P
48.02	Explain basic business organization and structure		P
48.03	Discuss the role of IT in meeting business strategic objectives		I
01	Identify common sources outlining strategic business objectives		
04	Identify business stakeholders (e.g., shareholders, customers, suppliers)		
48.04	Explain how IT functions interface with other business functions		P
48.05	Determine factors affecting business risk		I
01	Define business risk		
02	Identify types of business risks		
03	Describe ways to minimize business risks		
48.07	Demonstrate knowledge of cost-benefit analysis		I
01	Define cost and benefit analyses		
48.08	Explain the vendor management process		I
01	Define components of a RFP (Request for Proposals) [e.g., transmittal letter, instructions and procedures, and requirements and specifications]		
03	Identify common forms of vendor-buyer agreements		
	Number of Items in Module 3 = Number of Minutes to Allow =		32
	Number of Items in Module 4 = Number of Minutes to Allow =		27

## Modules 5 & 6

Unit 2	Operating Systems	G10	G12
02.01	Explain operating systems		P
02.03	Implement and maintain security compliance		I
02	Ensure compliance with security rules, regulations, and codes		
04	Assess exposure to security issues		
06	Install and update virus detection and protection software		
07	Identify sources of virus infections and remove viruses		
08	Implement backup and disaster recovery procedures		
09	Follow disaster plan		
10	Provide for user authentication (e.g., assign passwords, access level)		
02.04	Apply systems operations procedures		I
01	Apply basic commands of operating system software		
05	Follow power-up and logon procedures		
11	Follow logoff and power-down procedure(s)		
02.05	Maintain and respond to system needs		I
05	Install and upgrade software packages		
Unit 16	Hardware Design, Operation, and Maintenance	G10	G12
16.01	Demonstrate proficiency in working with microcomputer systems		P
16.03	Explain the purpose and importance of hardware standards	I	P
16.04	Identify common computing platforms		P
16.05	Analyze the computer site environment		I
02	Identify power requirements and power supplies		
04	Identify wiring specifications in compliance with state/local/federal codes		
16.06	Classify computer architecture and processor types		P
16.09	Identify and describe connectivity devices		P
16.10	Identify and describe peripheral equipment		P
16.11	Evaluate cost and performance issues in designing, building or upgrading a computer system		P
16.12	Troubleshoot computer systems		I
01	Test system using diagnostic tools/software		
02	Identify problems in the operating system and related hardware		
03	Differentiate between hardware and software failure		
04	Update flash memory (BIOS)		
05	Optimize hard drive		

Unit 26 Telecommunications		G10	G12
26.01	Demonstrate knowledge of transmission line applications		I
03	Discuss the principles and operation of coaxial cable		
04	Discuss the principles and operation of a microwave, satellite, and laser transmissions and receptions		
05	Discuss the principles and operation of optical, analog, and digital transmissions		
26.02	Demonstrate knowledge of concepts and techniques used in working with communications systems		I
03	Identify the characteristics and components of cabling systems		
05	Identify the characteristics of various types of light sources and light detectors used in fiber optic systems		
09	Discuss the characteristics of multi-mode and single-mode systems		
26.03	Demonstrate knowledge of telecommunications networks		I
03	Discuss advanced telecommunication broadband technologies (e.g., including frame relay and ATM, broadband, T1, T2, T3, Ethernet, IP)		
06	Discuss the characteristics, function and types of data compression and generational losses		
07	Discuss the function and characteristics of DSL technologies		
	Number of Items in Module 5 = Number of Minutes to Allow =		53
	Number of Items in Module 6 = Number of Minutes to Allow =		54

## Modules 7 & 8

Unit 4 Computer User Support		G10	G12
04.01	Analyze technical support needed		I
01	Identify support requirements		
06	Utilize technical assistance resources (e.g., knowledge-bases, remote control services, TAC centers, Web-based tools, and built-in help functions)		
04.02	Perform customer service		I
02	Respond to user questions		
04	Communicate and document technical support provided		
06	Diagnose problems within system		
08	Employ technical and computer tools to perform task in the most cost-effective manner		
09	Meet customer expectation in service delivery (e.g., SLA)		
04.03	Provide support and training		I
02	Support computer users		
06	Demonstrate ability to guide end-users through a support solution process		
Unit 17 Fundamentals of Electronics Technology		G10	G12
17.04	Demonstrate proficiency in working with AC circuits		I
02	List known AC sources		
03	Explain the principles and operation of various power conditioning systems (e.g., isolation transformers, surge suppressors, uninterruptible power systems)		

Unit 25	Wireless	G10	G12
25.01	Explain wireless communications		P
25.02	Design and implement a wireless network solution		I
01	Compare and contrast wireless solutions operating in ad hoc mode and infrastructure mode		
03	Define the Service Set Identifier (SSID) as used in wireless communications		
04	Select and install access points, wireless NICs, antennas and other hardware and software components to provide a wireless networking solution as determined by a site and customer survey		
25.03	Evaluate security concerns specific to wireless networks and devices, and techniques for minimizing those risks		I
01	Define and describe the practice of “war driving” and how to mitigate this risk		
02	Explain various methods of increasing the security of a wireless network, e.g., MAC address filtering, Wired Equivalent Privacy (WEP), Wi-Fi Protected Access (WPA), 802.1x and RADIUS)		
Unit 27	Information Systems (IS) Theory	G10	G12
27.01	Explain systems theory		I
01	Explain the underlying concepts of the information systems discipline		
02	Compare/contrast data, information, and knowledge		
05	Identify the properties of open and proprietary systems		
06	Define the relationship between system components		
07	Characterize the role of data representation, both non-numeric and numeric (e.g., integers, reals, errors)		
08	Identify procedures for formal problem solving		
09	Differentiate between the role of information systems within a company and their role in a global environment		
Unit 30	System Installation and Maintenance	G10	G12
30.06	Explain backup and recovery, both on and offsite		I
01	Compile backup and recovery plan to be used by technical support group and users		
02	Discuss backup procedures in accordance with a regular schedule		
03	Discuss recovery procedures as needed		
30.07	Troubleshoot problems		I
01	Demonstrate basic troubleshooting procedures		
02	Diagnose computer problems		
30.08	Evaluate problem-solving processes and results		I
01	Evaluate problem-solving outcomes to determine whether the problem was solved as intended		
02	Evaluate whether the process was applied in an efficient and responsible manner		
30.09	Integrate software upgrades and fixes		I
03	Install software upgrades or patches as needed		
	Number of Items in Module 7 = Number of Minutes to Allow =		49
	Number of Items in Module 8 = Number of Minutes to Allow =		46

**Modules 9 & 10**

Unit 18	Networking	G10	G12
18.01	Demonstrate knowledge of basic network classifications and topologies		P
18.02	Demonstrate knowledge of local-area network trends and issues		P
18.03	Demonstrate knowledge of network physical layer		P
18.04	Demonstrate knowledge of network connectivity basics		P
18.05	Demonstrate knowledge of protocol concepts		P
18.06	Demonstrate knowledge of the Open Systems Interconnection (OSI) standard (ISO Standard 7498)		P
18.07	Demonstrate knowledge of communication standards for networks		P
18.08	Demonstrate knowledge of data encoding basics		I
	01 Apply and convert amongst the four numbering systems. binary, octal, hexadecimal, and decimal		
	02 Demonstrate ASCII representation of characters		
18.09	Demonstrate knowledge of IP addressing schemes		P
Unit 19	Network Architectures	G10	G12
19.01	Demonstrate knowledge of the basics of network architecture		P
19.02	Demonstrate knowledge of the basics of Ethernet technology		P
19.03	Demonstrate knowledge of the TCP/IP protocol suite details		P
	Number of Items in Module 9 = Number of Minutes to Allow =		35
	Number of Items in Module 10 = Number of Minutes to Allow =		44

**Modules 11 & 12**

Unit 20	Network Operating Systems	G10	G12
20.01	Demonstrate knowledge of the network operating systems characteristics		P
20.02	Install and administer network operating system and services		I
	01 Create domain trusts		
	04 Employ policy templates		
	10 Create roaming user profiles		

Unit 21	Wide-Area Networks	G10	G12
21.01	Demonstrate knowledge of basic telecommunications and the interconnection of networks		P
21.02	Assess user needs for a wide-area network (WAN)		P
21.03	Design WAN systems		I
01	Describe the basics of telephony (analog vs. digital signals)		
03	Relate voice, data concepts, and video to wide-area networks		
05	Evaluate analog and digital transmission for cost, performance, and reliability		
07	Establish a Virtual Private Network (VPN) to form the infrastructure of the WAN		

Unit 22 Network Management

G10 G12

22.01	Demonstrate knowledge of network management activities and procedures	I
06	Determine methods for increasing performance (e.g., segmenting and balancing the network load, resolving channel and cable bottlenecks)	
07	Define the role of the network manager	
08	Determine procedures for performance analysis, evaluation, and monitoring	
09	Determine procedures for network system optimization and tuning	
22.02	Demonstrate knowledge of network applications	I
01	Describe how disk storage is shared across a network	
04	Identify and manage software licensing requirements and categories	
22.03	Solve network applications problems	I
01	Identify potential hardware compatibility problems	
02	Identify precautions included in programs used on networks (e.g., self-metering, security keys, required configuration settings)	
22.04	Perform network analysis, selection, and design	I
07	Identify physical requirements for system implementation	
22.05	Perform network installation procedures	I
02	Assess user needs to determine which network operating systems to use	
03	Set up/configure workstation-network connections	
04	Set up/configure network components (e.g., routers, switches)	
05	Install LAN	
07	Construct network cables	
22.06	Perform network operation procedures	I
01	Determine the type of wiring needed for the physical connection of the network	
04	Document LAN configuration	
05	Identify how the network protocols work together	
07	Set up/configure TCP/IP services on workstations and network servers	
22.07	Perform hardware and desktop support	I
02	Check physical and virtual connections	
04	Replace basic computer hardware	
22.08	Perform network administration	I
07	Troubleshoot system	
09	Perform system analysis	
17	Document and diagram network topology	
18	Describe authentication process to network devices and for users	
22.09	Perform network maintenance and diagnostics and testing	I
07	Develop a test plan	
11	Set up test environment	



22.10	Recommend disaster recovery and business continuity plans	I
02	Identify common backup devices	
03	Identify the criteria for selecting a backup system (e.g., tape)	
04	Establish process for archiving files	
Number of Items in Module 11 = Number of Minutes to Allow =		30
Number of Items in Module 12 = Number of Minutes to Allow =		29

## Module 13

Unit 23	Security Fundamentals	G10	G12
23.01	Examine the history and components of information assurance	I	
02	Describe the evolution of major threats to computers including physical security, viruses, worms, spyware, malware, and hacker attempts and the influence this has had on the current state of information assurance		
04	Describe the role of networking and the increased need for security and information assurance		
05	Discuss how legislative and ethical issues and standards have impacted network security (e.g., HIPPA, GLBA, SOX)		
06	Discuss the need for confidentiality, integrity, and availability of information (CIA)		
07	Discuss the need for authentication and non-repudiation of information (e.g., PKI)		
08	Illustrate security risks and associated safeguards		
10	Discuss careers and certification programs associated with security		
23.02	Describe the components associated with computer and network security systems	I	
01	Identify and discuss biometric systems (e.g., fingerprinting, retina scans, voice analysis)		
02	Describe two-factor authentication techniques (e.g., smart cards)		
05	Explain the role of hashing algorithms (e.g., MD5, SHA1) in achieving information assurance and integrity		
06	Discuss the need for policy addressing confidentiality		
Unit 24	Secure Network Management	G10	G12
24.01	Implement secure network management activities and procedures	I	
03	Analyze network security issues		
04	Identify security requirements		
24.04	Explain communication in a WAN environment	I	
02	Describe methods for encrypting communication (e.g., IPSEC)		
03	Describe VPNs using tunneling protocols and encrypting techniques		
Number of Items in Module 13 = Number of Minutes to Allow =		49	

## Modules 14 & 15

Unit	Business Processes for IT Professionals	G10	G12
44.01	Demonstrate knowledge of project planning methodology		P
44.02	Conduct requirements analysis		I
	01 Identify business needs/expectations		
	04 Specify data requirements		
44.03	Demonstrate knowledge of the requirements analysis phase		I
	03 Explain budget and time restraints		
	05 Explain how internal and external forces impact project requirements		
44.04	Identify current technical environment		I
	02 Identify current internal and external technology		
44.05	Demonstrate knowledge of design alternatives and options		I
	01 Determine return on investment (ROI) [e.g., cost-benefit analysis]		
	02 Explain Total Cost of Ownership (TCO)		
44.06	Demonstrate knowledge of how systems and products are developed		I
	01 Define components that go into the development plan (e.g., hardware, software, communications)		
44.07	Discuss solutions versus requirements		P
44.08	Explain quality assurance processes		I
	01 Discuss the historical evolution of quality assurance initiatives		
	04 Identify the features and benefits of quality planning		
44.09	Demonstrate knowledge of the testing environment		I
	04 Identify the purpose of acceptance testing		
44.10	Describe key components of an implementation plan (e.g., communication, business continuity plan)		I
	01 Identify turn-back points (e.g., go or no-go)		
	02 Identify new work processes and procedures		
44.11	Explain the value a communication plan can provide to implementation		P
44.12	Explain the value a training plan can provide to implementation		I
	02 Identify common training methodologies (e.g., computer-based, hands on)		
	04 Identify functions of a training plan		
44.13	Explain how business continuity plans (e.g., disaster recovery, roll-back) interrelate with implementation plans		I
	02 Describe purpose and components of a fall-back plan (e.g., disaster recovery plan)		
	03 Describe purpose and components of a business continuity plan		
44.14	Demonstrate knowledge of information technology operations and maintenance		I
	01 Describe maintenance and operations phase		

44.15	Explain the role of maintenance as part of the IT function	I
02	Define upgrade process	
03	Define Service Level Agreements (SLAs)	
44.16	Define components of incidence and problem management	I
02	Explain different methodologies for event notification (e.g., paging, e-mail)	
44.17	Identify components of change management process	I
01	Define the change and value of change	
04	Explain the impact of change	
05	Contact all affected parties	
Unit 47	Professional Practices	G10 G12
47.01	Identify legal and ethical behavior	P
47.02	Explain professional responsibilities	P
47.03	Explain the role of the IT professional in maintaining customer satisfaction	P
47.04	Explain the importance of teams in achieving IT project goals	P
47.05	Explain the importance of professional behavior in the IT environment	P
47.06	Explain the importance of health and safety standards and concepts in the IT workplace	P
	Number of Items in Module 14 = Number of Minutes to Allow =	29
	Number of Items in Module 15 = Number of Minutes to Allow =	38