Texas CTE

Information Technology (2010): Grade 12

Adopted 2010

Computer Maintenance

(1) The student demonstrates the necessary skills for career development, employability, and successful completion of course outcomes. The student is expected to:

(A) identify and demonstrate positive work behaviors that enhance employability and job advancement such as regular attendance, promptness, attention to proper attire, maintenance of a clean and safe work environment, appropriate voice, and pride in work;

(B) identify and demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, listening attentively to speakers, and willingness to learn new knowledge and skills;

(C) employ effective reading and writing skills;

(D) employ effective verbal and nonverbal communication skills;

(E) solve problems and think critically;

(F) demonstrate leadership skills and function effectively as a team member;

(G) identify and implement proper safety procedures;

(H) demonstrate an understanding of legal and ethical responsibilities in relation to the field of information technology; and

(I) demonstrate planning and time-management skills such as project management and storyboarding.

(2) The student identifies various employment opportunities in the information technology field. The student is expected to:

(A) identify job opportunities and accompanying job duties and tasks;

(B) research careers of personal interest along with the education, job skills, and experience required to achieve personal career goals; and

(C) examine the role of certifications, resumés, and portfolios in the information technology profession.

(3) The student applies academic skills to the requirements of computer technologies. The student is expected to:

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(A) demonstrate effective verbal and written communication skills with individuals from varied cultures such as fellow workers, management, and customers;

(B) complete work orders for repair and installation;

(C) estimate supplies, materials, and labor costs for installation, maintenance, and repair work orders; and

(D) interpret appropriate documentation such as schematics, drawings, charts, diagrams, technical manuals, and bulletins.

(4) The student acquires an understanding of computer technologies. The student is expected to:

(A) explain the fundamentals of microprocessor theory;

(B) define the use of Boolean logic in computer technologies;

(C) explain the theories of magnetism, electricity, and electronics as related to computer technologies;

(D) explain proper troubleshooting techniques as related to computer hardware;

(E) differentiate among digital, analog, and input and output electronics theory;

(F) explain the relationships relative to data-communications theory;

(G) describe the architecture of various computer systems;

(H) describe the function of computer components such as central processing units, storage devices, and peripheral devices; and

(I) explain computer system environmental requirements and related control devices.

(5) The student knows the proper function and application of the tools, equipment, and materials used in computer technologies. The student is expected to:

(A) demonstrate safe use of equipment in computer technologies such as hand and power tools;

(B) employ available reference documentation such as tools, materials, and Internet sources to access information as needed;

(C) demonstrate proper handling and disposal of environmentally hazardous materials used in computer technologies; and

(D) identify new and emerging technologies that may affect the field of computer technology such as quantum computing, phototonics, and nanotechnology.

(6) The student applies the concepts and skills of the trade in simulated work situations. The student is expected to:

(A) use electronic test equipment to measure current, voltage, power, and resistance;

(B) describe digital circuits design;

(C) identify the operational features and proper terminology related to computer systems;

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(D) identify the various components of a computer system such as the central processor, basic input and output system, read-only memory, and random access memory; and

(E) troubleshoot computer peripheral devices.

(7) The student uses hardware design, operation, and maintenance knowledge and skills to provide computer support. The student is expected to:

(A) identify the purpose and function of computer components in the operation of the computer system such as central processing unit, mother board, sockets, chipsets, basic input and output system and their drivers, memory, hard drive technologies, video cards, input and output devices and ports, and modem and network interface cards (NIC);

(B) identify the operation of mobile devices such as personal data assistants and cell phones;

(C) identify how mobile devices such as personal data assistants and cell phones connect and share data;

(D) assemble and install a basic computer system; and

(E) install and configure computer components and peripherals.

(8) The student uses troubleshooting skills with hardware knowledge to solve client problems. The student is expected to:

(A) understand the rationale behind error messages and symptoms of hardware failures;

(B) know interrupt sequences and beep codes;

(C) identify priorities and interrupts at the system level;

(D) test system using diagnostic tools and software;

(E) identify problems in the operating systems;

(F) differentiate between hardware and software failure;

(G) update flash memory;

(H) demonstrate hard drive maintenance procedures such as defrag scan and clear caches;

(I) gather information from user;

(J) repair malfunctioning hardware systems;

(K) reinstall software as needed;

(L) demonstrate backup and recovery; and

(M) restore a system to various states such as safe modes and previous.

(9) The student demonstrates and applies knowledge of operating system design, including operation and maintenance, to perform information support and service tasks. The student is expected to:

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(A) explain the fundamentals of an operating system; and

(B) compare and contrast different operating systems.

(10) The student installs and configures software programs and updates information technology systems. The student is expected to:

(A) evaluate application software packages and test the functionality of a proposed software configuration;

(B) verify software is properly licensed prior to installation;

(C) install application and systems software using available resources as needed;

(D) resolve problems with installation if any occur, including recovery from system error;

(E) perform software customization as requested;

(F) document all procedures; and

(G) install and maintain security software.

(11) The student installs, configures, and verifies active network connection. The student is expected to:

(A) demonstrate an understanding of network connection and interface requirements;

(B) install and configure a computer on a network; and

(C) verify and troubleshoot network connectivity.

(12) The student provides support to computer users to maintain service. The student is expected to:

(A) develop a written disaster recovery plan; and

(B) develop a written preventive maintenance plan.

Telecommunications and Networking

(1) The student demonstrates the necessary skills for career development, employability, and successful completion of course outcomes. The student is expected to:

(A) identify and demonstrate positive work behaviors that enhance employability and job advancement such as regular attendance, promptness, attention to proper attire, maintenance of a clean and safe work environment, appropriate voice, and pride in work;

(B) identify and demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, listening attentively to speakers, and willingness to learn new knowledge and skills;

(C) employ effective reading and writing skills;

(D) employ effective verbal and nonverbal communication skills;

(E) solve problems and think critically;

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(F) demonstrate leadership skills and function effectively as a team member;

(G) identify and implement proper safety procedures;

(H) demonstrate an understanding of legal and ethical responsibilities in relation to the field of information technology; and

(I) demonstrate planning and time-management skills such as project management and storyboarding.

(2) The student identifies various employment opportunities in the information technology field. The student is expected to:

(A) select and research a specific job area with its accompanying duties and tasks;

(B) formulate a personal career plan along with the education, job skills, and experience necessary to achieve career goals; and

(C) develop a resumé.

(3) The student relates core academic skills to the requirements of telecommunications and data network services. The student is expected to:

(A) demonstrate effective verbal and written communication skills with individuals from varied cultures such as fellow workers, management, and customers;

(B) complete work orders for repair and installation;

(C) estimate supplies, materials, and labor costs on installation, maintenance, and repair work orders; and

(D) interpret technical documentation such as schematics, drawings, charts, diagrams, technical manuals, and bulletins.

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(4) The student acquires an understanding of telecommunications and data network services. The student is expected to:

(A) explain the theories of electricity and electronics;

(B) explain proper troubleshooting techniques for alternating and direct current electronics;

(C) explain digital and analog electronics theory;

(D) explain microcomputer processor theory;

(E) define the use of Boolean logic in computer technologies;

(F) distinguish the differences between a data packet and voice communications;

(G) define the layers and functions of the Open System Interconnection model;

(H) explain Transport Control Protocol and Internet Protocol fundamentals, including subnetting;

(I) distinguish between public and private networks;

(J) describe the standards and operations of wireless technologies in telecommunications and data networks;

(K) differentiate between local area networks and wide area networks;

(L) identify national standards for voice and data communication; and

(M) identify the potential benefits and problems for the future of telecommunications and data networking.

(5) The student analyzes various types of configurations and upgrading. The student is expected to:

(A) identify the attributes, purposes, and functions of the various components of telecommunications and data networks;

(B) identify major network operating systems;

(C) distinguish between different types of cables used in the telecommunications and data networking;

(D) describe telecommunications and data networking media and connectors;

(E) recognize the differences among computer network topologies;

(F) explain the distinction between connectionless and connection transport;

(G) explain how and when to use the Transport Control Protocol and Internet Protocol utilities;

(H) explain how and when to test, validate, and troubleshoot Internet Protocol connectivity; and

(I) identify good practices to ensure network security.

(6) The student recognizes and recommends the various types of network components to address industry needs. The student is expected to:

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(A) analyze various types and components of networks;

(B) analyze the characteristics of networks used to select the optimum configuration for an industry solution; and

(C) recommend telecommunications and data network solutions based on scenario-driven problems such as budget restrictions and knowledge of relative costs of the technologies.

(7) The student develops a network design plan. The student is expected to:

(A) produce the network planning documentation required prior to network implementation such as administrative and test accounts, passwords, Internet Protocol addressing, and configurations;

(B) explain the impact of environmental factors on computer networks;

(C) identify common peripheral ports and common network components;

(D) develop an addressing scheme, including a subnetting chart;

(E) specify the tools that are commonly used to resolve network equipment problems;

(F) identify vendor testing documentation such as patches, fixes, and upgrades;

(G) demonstrate awareness of standard backup procedures and backup media storage practices;

(H) distinguish between common types of telecommunications and data network cabling;

(I) identify the factors that might affect performance in a network environment such as logic or frequency spectrum interference; and

(J) identify new and emerging technologies that may affect the field of telecommunications and data networking services.

(8) The student implements a data network plan. The student is expected to:

(A) demonstrate in an installation scenario awareness of compatibility and cabling issues;

(B) implement an addressing scheme, including a subnetting chart;

(C) connect various types of data connectors and cabling used in computer networking and data communications;

(D) employ a systematic approach to identify the extent of a network problem, distinguish between operator or system error, and select the appropriate steps to correct the error;

(E) analyze networking scenarios and demonstrate awareness of the need to check for physical and logical indicators of trouble;

(F) determine the cause of a problem and select the appropriate corrective action for the network problem; and

(G) create a folder or hierarchical structure for the storing and organizing of data on networks.

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(9) The student implements network security systems. The student is expected to:

(A) assess potential security threats to information systems;

(B) identify the range of security needs and the problems that can occur on a data network due to security lapses;

(C) define and identify unethical practices such as hacking, phone fraud, online piracy, and data vandalism;

(D) evaluate issues related to privacy, depersonalization, and government control of telecommunications;

(E) develop and implement a network security plan; and

(F) identify the role that network components such as routers, firewalls, intrusion detection systems, and virtual private networks play in security.

(10) The student knows the function and application of the tools, equipment, technologies, and materials used in telecommunications services. The student is expected to:

(A) demonstrate safe use of equipment commonly employed in telecommunications services such as hand and power tools; and

(B) demonstrate proper handling and disposal of environmentally hazardous materials used in telecommunications services.

Computer Technician

(1) The student demonstrates the necessary skills for career development, employability, and successful completion of course outcomes. The student is expected to:

(A) identify and demonstrate positive work behaviors that enhance employability and job advancement such as regular attendance, promptness, attention to proper attire, maintenance of a clean and safe work environment, appropriate voice, and pride in work;

(B) identify and demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, listening attentively to speakers, and willingness to learn new knowledge and skills;

(C) employ effective reading and writing skills;

(D) employ effective verbal and nonverbal communication skills;

(E) solve problems and think critically;

(F) demonstrate leadership skills and function effectively as a team member;

(G) identify and implement proper safety procedures;

(H) demonstrate an understanding of legal and ethical responsibilities in relation to the field of information technology; and

(I) demonstrate planning and time-management skills such as project management and storyboarding.

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The student identifies various employment opportunities in the information technology field. The student is expected to:

(A) improve on a personal career plan along with education, job skills, and experience necessary to achieve career goals;

(B) develop a resumé appropriate to chosen career plan, including letters of recommendation; and

(C) illustrate interview skills for successful job placement.

(3) The student relates core academic skills to the requirements of computer technologies. The student is expected to:

(A) demonstrate effective verbal and written communication skills with individuals from varied cultures such as fellow workers, management, and customers;

(B) complete work orders and related paperwork for repair and installation;

(C) estimate supplies, materials, and labor costs for installation, maintenance, and repair work orders; and

(D) read and interpret technical documentation such as schematics, drawings, charts, diagrams, technical manuals, and bulletins.

(4) The student applies communication, mathematics, English, and science knowledge and skills to research and develop projects. The student is expected to:

(A) demonstrate proper use of written, verbal, and visual communication techniques consistent with information technology industry standards;

(B) demonstrate proper use of mathematics concepts as they apply to the development of products or services; and

(C) demonstrate proper use of science principles to the development of products or services.

(5) The student knows the concepts and skills that form the basis of computer technologies. The student is expected to:

(A) explain microprocessor theory;

(B) define the use of Boolean logic in computer technologies;

(C) describe the theories of magnetism, electricity, and electronics as they apply to computer systems;

(D) identify proper troubleshooting techniques;

(E) differentiate among digital, analog, and input and output electronics theories;

(F) describe the architecture of various computer systems;

(G) describe the function of central processing units, storage devices, peripheral devices, and microprocessor units; and

(H) explain computer system environmental requirements and related control devices.

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The student knows the proper function and application of the tools, equipment, technologies, and materials used in computer technologies. The student is

expected to:

(A) demonstrate safe use of equipment in computer technologies such as hand and power tools;

(B) employ available reference tools, materials, and Internet sources to access information as needed;

(C) demonstrate the proper handling and disposal of environmentally hazardous materials used in computer technologies; and

(D) identify new and emerging technologies that may affect the field of computer technology such as quantum computing, photonics, and nanotechnology.

(7) The student applies the essential knowledge and skills for computer technologies to career preparation, job shadowing, mentoring, or apprenticeship training in simulated and actual work situations. The student is expected to:

(A) identify a problem relating to information technology;

(B) develop a solution using appropriate technologies, information technology concepts, and information technology industry standards;

(C) explain how the proposed technological solution will resolve the problem and the methodologies involved;

(D) apply decision-making techniques to the selection of technological solutions;

(E) identify areas where quality, reliability, and safety can be designed into a product or service;

(F) apply critical-thinking strategies to the analysis and evaluation of the proposed technological solution;

(G) develop a sustainability plan for the product or service;

(H) select and use the appropriate technological resources to conduct research, design, and development activities;

(I) develop the documentation of the research and development process; and

(J) present the solution to a panel of professionals using formal presentation skills.

(8) The student employs project management knowledge to oversee information technology projects. The student is expected to:

(A) implement project methodologies to manage information system projects;

(B) define the scope of work to achieve individual and group goals;

(C) develop time and activity plans to achieve objectives;

(D) implement cross-functional teams to achieve information technology project goals;

(E) develop and implement quality assurance test plans; and

(F) create a contingency plan.

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(9) The student recognizes and analyzes potential information technology security threats to develop and maintain security requirements. The student is expected to:

(A) describe potential security threats to information systems;

(B) identify the range of security needs and the problems that can occur due to security lapses;

(C) develop and implement plans to address security threats;

(D) document security procedures; and

(E) describe the use of computer forensics in countering security threats such as information technology crimes and security breaches.

(10) The student provides support to computer users to maintain service. The student is expected to:

(A) employ effective listening skills when working with clients to identify support needs;

(B) identify customer need and formulate a support plan;

(C) create queries and reports and assess critical system information;

(D) employ problem-solving skills in performing support, maintenance, and repair;

(E) use hardware and software diagnostics; and

(F) report to the user the cause of and solution to the problem.

(11) The student creates a personal portfolio. The student is expected to:

(A) create a portfolio that documents all projects and accomplishments such as academics, volunteer experience, employment experience, awards, and certifications;

(B) organize and prioritize information within the portfolio; and

(C) use written, verbal, and visual communication techniques consistent with information technology industry standards.

Computer Programming

(1) The student demonstrates the necessary skills for career development, maintenance of employability, and successful completion of course outcomes. The student is expected to:

(A) identify and demonstrate positive work behaviors that enhance employability and job advancement such as regular attendance, promptness, attention to proper attire, maintenance of a clean and safe work environment, appropriate voice, and pride in work;

(B) identify and demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, listening attentively to speakers, and willingness to learn new knowledge and skills;

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(C) employ effective reading and writing skills;

(D) employ effective verbal and nonverbal communication skills;

(E) solve problems and think critically;

(F) demonstrate leadership skills and function effectively as a team member;

(G) demonstrate and implement proper safety procedures in handling and disposing of equipment and materials;

(H) demonstrate an understanding of legal and ethical responsibilities in relation to the field of information technology; and

(I) demonstrate planning and time-management skills such as project management and storyboarding.

(2) The student identifies various employment opportunities in the information technology field. The student is expected to:

(A) identify job opportunities and accompanying job duties and tasks;

(B) research careers of personal interest along with the education, job skills, and experience required to achieve personal career goals; and

(C) examine the role of certifications, resumés, and portfolios in the information technology profession.

(3) The student differentiates the concepts of integrity and confidentiality as related to technology in the business environment. The student is expected to:

(A) define business ethics;

(B) distinguish between honest and dishonest business practices;

(C) examine copyright and licensing issues in the software industry; and

(D) analyze the effects of unethical practices on a business.

(4) The student identifies and analyzes the client project software needs and requirements. The student is expected to:

(A) gather data to identify client and project requirements;

(B) identify input and output requirements;

(C) identify system processing requirements; and

(D) develop software requirements and specifications.

(5) The student develops an information technology-based project plan to solve a specific problem. The student is expected to:

(A) define scope of work to meet client-based project needs;

(B) identify software development processes and issues; and

(C) explain the software system life cycle approach.

(6) The student designs a software application plan. The student is expected to:

(A) articulate the principles of system design such as procedural, object-oriented, and event-driven processes;

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(B) perform a logical design using appropriate software tools;

(C) use algorithmic and data structure concepts;

(D) identify constraints;

(E) identify modular design concepts; and

(F) document the design specification using a defined procedure.

(7) The student solves problems using different types and levels of programming languages. The student is expected to:

(A) differentiate among the concepts of data, procedural, object-oriented, and event-driven representation;

(B) identify current programming languages and the environment in which each is used;

(C) produce procedural and object-oriented programs using structured coding with appropriate style and clarity of expression;

(D) demonstrate skill in program testing;

(E) compare computed results with anticipated results to determine the reasonableness of the solutions; and

(F) troubleshoot technological problems.

(8) The student performs quality assurance tasks. The student is expected to:

(A) explain the software quality assurance process; and

(B) follow established quality assurance procedures for testing, identifying problems, and tracking resolutions.

(9) The student recognizes issues and complies with procedures for maintaining the security of computerized information. The student is expected to:

(A) identify risks to information systems facilities, data communications systems, and applications;

(B) comply with federal and state legislation pertaining to computer crime, fraud, and abuse;

(C) identify and select controls for information systems facilities, data communications, and applications appropriate to specific risks; and

(D) apply procedures used to recover from situations such as system failure and computer virus.

Advanced Computer Programming

(1) The student demonstrates the necessary skills for career development, maintenance of employability, and successful completion of course outcomes. The student is expected to:

(A) identify and demonstrate positive work behaviors that enhance employability and job advancement such as regular attendance, promptness, attention to proper attire, maintenance of a clean and safe work environment, appropriate voice, and pride in work;

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(B) identify and demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, listening attentively to speakers, and willingness to learn new knowledge and skills;

(C) employ effective reading and writing skills;

(D) employ effective verbal and nonverbal communication skills;

(E) solve problems and think critically;

(F) demonstrate leadership skills and function effectively as a team member;

(G) identify and implement proper safety procedures;

(H) demonstrate an understanding of legal and ethical responsibilities in relation to the field of information technology; and

(I) demonstrate planning and time-management skills such as project management and storyboarding.

(2) The student identifies various employment opportunities in the information technology field. The student is expected to:

(A) improve on a personal career plan along with education, job skills, and experience necessary to achieve career goals;

(B) develop a resumé appropriate to chosen career plan, including letters of recommendation; and

(C) illustrate interview skills for successful job placement.

(3) The student identifies project software needs and requirements. The student is expected to:

(A) identify input and output requirements;

(B) identify system processing requirements;

(C) identify hardware, networking, and software system functional requirements;

(D) conduct project needs analysis;

(E) define a problem to be solved by created application;

(F) analyze requirements specifications using current approaches;

(G) identify project constraints; and

(H) use advanced modeling and analysis of functional requirements.

(4) The student produces an information technology based strategy and project plan to solve a provided class problem. The student is expected to:

(A) identify key functions and subsystem capabilities of modern software products;

(B) identify software resources and individual product risks; and

(C) identify software development methodologies.

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The student demonstrates knowledge of the software development environment. The student is expected to:

(A) use prototyping techniques;

(B) use appropriate configuration management tools;

(C) apply language-specific programming techniques;

(D) develop programs using appropriate language;

(E) use the appropriate development environment for each selected language such as the compiler, debugger, test generator, and analyzer;

(F) use appropriate modeling and analysis tools; and

(G) use appropriate requirement tracking tools.

(6) The student demonstrates knowledge of the software development process. The student is expected to:

(A) articulate the information system life cycle;

(B) identify system analysis issues related to design, testing, implementation, and maintenance;

(C) identify the use of program design tools in a software development process; and

(D) identify current information life cycle models.

(7) The student designs a software application. The student is expected to:

(A) use principals of system design such as structured, object-oriented, and event-driven processes;

(B) perform a logical design;

(C) document design specifications according to a defined procedure;

(D) design system input, output, processing, and interfaces;

(E) identify the characteristics and uses of data processing such as batch, interactive, event driven, and object oriented;

(F) explain algorithmic and data structure concepts;

(G) identify constraints;

(H) identify modular design concepts;

(I) identify the features, functions, and architectures of client server computing;

(J) articulate database management concepts;

(K) define the objectives of a client server application;

(L) design static and dynamic online processing systems; and

(M) employ interface techniques.

(8) The student codes a computer application. The student is expected to:

(A) apply programming language concepts;

(B) identify the hardware software connection;

(C) articulate the concept of data representation;

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(D) use structured, object-oriented, and event-driven programming techniques;

(E) articulate how a programming language can support multitasking and exception handling;

(F) identify how current key programming languages work in different operating system environments;

(G) translate data structures and program design into code in an appropriate language;

(H) demonstrate key constructs and commands specific to a language;

(I) identify the range of languages used in software development;

(J) explain how to resolve program implementation issues such as debugging, documentation, and auditing;

(K) articulate software development issues such as correctness, reliability, and productivity;

(L) explain code analysis issues related to design, testing, implementation, and maintenance;

(M) demonstrate how to design and implement programs in a top-down manner;

(N) demonstrate how to translate algorithmic and modular design into computer code;

(O) explain how programming control structures are used to verify correctness;

(P) use appropriate programming language in writing computer code;

(Q) compile and debug computer code;

(R) prepare code documentation;

(S) prepare a project testing plan; and

(T) conduct unit testing and bug fixes of computer code.

(9) The student demonstrates knowledge of software testing. The student is expected to:

(A) develop a test plan;

(B) define test procedures;

(C) develop test cases; and

(D) perform software testing.

(10) The student performs quality assurance testing. The student is expected to:

(A) explain the software quality assurance process;

(B) use standard requirements for software quality assurance;

(C) perform software quality assurance tasks to determine a quality software product; and

(D) conduct code inspection.

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(11) The student performs maintenance and customer support functions: The student is expected to:

(A) identify maintenance and support requirements;

(B) perform system-tuning functions; and

(C) implement corrections to the code and documentation.

(12) The student applies procedures for maintaining the security of computerized information. The student is expected to:

(A) identify risks to information systems facilities, data, communication systems, and applications;

(B) comply with federal and state legislation pertaining to computer crime, fraud, and abuse;

(C) identify and select controls for information systems facilities, data communications, and applications appropriate to specific risks; and

(D) apply procedures used to recover from situations such as system failure and computer virus.

Digital and Interactive Media

(1) The student demonstrates the necessary skills for career development, maintenance of employability, and successful completion of course outcomes. The student is expected to:

(A) identify and demonstrate positive work behaviors that enhance employability and job advancement such as regular attendance, promptness, attention to proper attire, maintenance of a clean and safe work environment, appropriate voice, and pride in work;

(B) identify and demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, listening attentively to speakers, and willingness to learn new knowledge and skills;

(C) employ effective reading and writing skills;

(D) employ effective verbal and nonverbal communication skills;

(E) solve problems and think critically;

(F) demonstrate leadership skills and function effectively as a team member;

(G) identify and implement proper safety procedures;

(H) demonstrate an understanding of legal and ethical responsibilities in relation to the field of information technology; and

(I) demonstrate planning and time-management skills such as project management and storyboarding.

(2) The student identifies employment opportunities in the information technology field with a focus in the area of interactive media. The student is expected to:

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(A) identify job opportunities and accompanying job duties and tasks;

(B) research careers of personal interest along with the education, job skills, and experience required to achieve personal career goals;

(C) examine the role of certifications, resumés, and portfolios in the information technology profession; and

(D) create a portfolio.

(3) The student uses emerging technologies to exchange and gather information and resources. The student is expected to:

(A) collaborate using various electronic technologies such as email, blogs, chat rooms, discussion threads, and wikis;

(B) use Internet resources for research purposes; and

(C) research technologies that have surfaced within the last three years in the area of interactive media.

(4) The student complies with standard practices and behaviors that meet legal and ethical responsibilities. The student is expected to:

(A) examine copyright and fair use guidelines in the digital media industry;

(B) model ethical and legal acquisition of digital information, including the correct citing of sources through the use of established methods; and

(C) demonstrate proper netiquette and acceptable use policies when using networks.

(5) The student analyzes and applies design and layout principles. The student is expected to:

(A) compare and contrast printed and digital communications products that demonstrate appropriate and inappropriate use of design and layout principles;

(B) identify and use perspective such as backgrounds, light, shades, shadows, and scale to capture a focal point and create depth;

(C) identify and use principles of proportion, balance, variety, emphasis, harmony, symmetry, unity, and repetition in type, color, size, line thickness, shape, and space;

(D) identify and use three-dimensional effects such as foreground, middle distance, and background images;

(E) identify and use typography;

(F) identify and use color theory; and

(G) recreate and improve existing multimedia products by applying the appropriate design and layout principles.

(6) The student designs and creates digital graphics. The student is expected to:

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(A) compare and contrast the characteristics of raster-based bitmap graphics and vector-based graphics;

(B) demonstrate appropriate file storage and file size management skills;

(C) recognize the various file extensions used in digital and interactive media such as compression, conversion, and use and modification;

(D) identify and choose appropriate software applications for specific digital media types such as photo, graphics, video, audio, and animation editing software; and

(E) differentiate between the color mode selections in determining product output.

(7) The student demonstrates appropriate use of digital photography equipment and techniques. The student is expected to:

(A) demonstrate proper use of safety procedures while using digital photography equipment;

(B) capture still shot images using digital photography equipment incorporating various photo composition techniques such as lighting, perspective, candid versus posed, rule of thirds, and level of horizon;

(C) transfer still shot images from equipment to the computer; and

(D) demonstrate photographic enhancement techniques such as feathering, layering, masking, and color enhancement using appropriate digital manipulation software.

(8) The student demonstrates appropriate use of digital graphics. The student is expected to:

(A) create and modify digital graphics using appropriate vector-based and raster-based software following standard design principles; and

(B) export and set graphics to be used in both print and digital formats.

(9) The student demonstrates appropriate use of video equipment and techniques. The student is expected to:

(A) demonstrate proper use of safety procedures while using digital video equipment;

(B) demonstrate proper use of terminology in relation to video technology;

(C) demonstrate proper use of digital video photography equipment to capture video images;

(D) transfer video images from equipment to the computer;

(E) demonstrate videographic enhancement and editing techniques such as panning, transitions, zooming, content editing, and synchronizing audio and video using appropriate digital manipulation software; and

(F) export video files in digital formats to be used in various delivery systems such as podcasting, downloadable media, and streaming.

(10) The student demonstrates appropriate use of audio equipment and techniques. The student is expected to:

(A) demonstrate proper use of safety procedures while using digital audio equipment;

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(B) demonstrate proper use of terminology and concepts in relation to audio technology;

(C) demonstrate proper use of digital audio equipment to capture audio files;

(D) transfer audio files from equipment to the computer;

(E) demonstrate proper use of audio editing software such as adding effects, fading, volume control, and manipulation of waveforms using appropriate digital manipulation software; and

(F) export audio files to be used in digital formats in various delivery systems such as podcasting, downloadable files, and streaming.

(11) The student demonstrates appropriate use of animation. The student is expected to:

(A) use the principles of motion graphics such as frames and key frames, integration of audio into an animation, and user interactive controls;

(B) create and modify a linear and a nonlinear animation using appropriate software following standard design principles; and

(C) export and set animation to be used in various digital formats and on various video animation players.

(12) The student demonstrates appropriate project management in the creation of digital media projects. The student is expected to:

(A) develop a plan for a media project such as a storyboard, stage development, and identification of equipment and resources; and

(B) evaluate a project plan along its timeline and make suggested revisions until completion of the project.

(13) The student deploys digital media into print, web-based, and video products. The student is expected to:

(A) incorporate video, audio, text, graphics, and motion graphics into an existing web page;

(B) incorporate various digital media into a printed document such as a newsletter, poster, or report;

(C) develop an interactive medium such as a compact disk or digital video disk to display video, audio, and animation products; and

(D) collect and organize student created products to build an individual portfolio.

Web Technologies

(1) The student demonstrates the necessary skills for career development, maintenance of employability, and successful completion of course outcomes. The student is expected to:

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(A) identify and demonstrate positive work behaviors that enhance employability and job advancement such as regular attendance, promptness, attention to proper attire, maintenance of a clean and safe work environment, appropriate voice, and pride in work;

(B) identify and demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, listening attentively to speakers, and willingness to learn new knowledge and skills;

(C) examine the role of certifications, resumés, and portfolios in the web technology profession;

(D) employ effective verbal and nonverbal communication skills;

(E) solve problems and think critically;

(F) demonstrate leadership skills and function effectively as a team member;

(G) identify and implement proper safety procedures;

(H) demonstrate an understanding of legal and ethical responsibilities in relation to the field of information technology; and

(I) demonstrate planning and time-management skills such as project management and storyboarding.

(2) The student identifies employment opportunities in the information technology field with a focus in the area of interactive media. The student is expected to:

(A) identify job opportunities and accompanying job duties and tasks;

(B) research careers of personal interest along with the education, job skills, and experience required to achieve personal career goals;

(C) demonstrate an understanding of the functions of resumés and portfolios; and

(D) create a portfolio.

(3) The student demonstrates knowledge and appropriate use of hardware, software, and connectivity technologies. The student is expected to:

(A) explain the fundamentals of operating systems;

(B) explain the key functions and applications of software programs;

(C) identify telecommunications and networking components;

(D) evaluate the various input, processing, output, and storage devices;

(E) identify current and future Internet protocols such as hypertext transfer protocol, file transfer protocol, telnet, and email; and

(F) identify new web technology trends.

(4) The student complies with practices and behaviors that meet legal and ethical responsibilities. The student is expected to:

(A) examine copyright and licensing issues in the software industry;

(B) model ethical and legal acquisition of digital information, including the correct citing of sources through the use of established methods; and

(C) demonstrate proper netiquette and acceptable use policies when using networks.

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(5) The student acquires electronic information in a variety of formats, using research skills and electronic communication to create new knowledge, with appropriate supervision. The student is expected to:

- (A) demonstrate appropriate use of navigation of network resources for information acquisition and sharing;
- (B) acquire information in electronic formats such as text, audio, video, and graphics, citing the source;
- (C) identify, create, modify, and use available file formats such as text, image, video analog and digital, and audio files; and
- (D) synthesize information from data acquired from electronic and telecommunications resources.

(6) The student evaluates electronic information. The student is expected to:

- (A) identify appropriate methods to analyze the design and functionality of web pages; and
- (B) demonstrate skill in testing the accuracy and validity of information acquired.

(7) The student evaluates and employs computer-based productivity tools to create and modify web and digital media designs. The student is expected to:

- (A) implement functional design criteria such as proximity, repetition, contrast, alignment, color theory, consistency, image file size, and typography;
- (B) select, create, modify, and integrate effective multimedia content such as vector-based and raster graphics, motion graphics, video, and audio;
- (C) create web pages in accordance with current web standards using web development skills such as version control, documentation, web application security, validation, accessibility, and compatibility across multiple browsers and devices; and
- (D) demonstrate proper use of folder structure hierarchy.

(8) The student demonstrates knowledge of Internet programming strategies. The student is expected to:

- (A) recognize the importance of Internet programming standards;
- (B) differentiate among various web coding standards such as HyperText Markup Language, Extensible HyperText Markup Language, and cascading style sheets;
- (C) use standard applications such as text-based editing programs, word processors; and web authoring software; and
- (D) compare and contrast the impact of different browsers on web development.

(9) The student employs knowledge of web programming to develop and maintain web applications. The student is expected to:

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- (A) explain the purpose of current web content delivery enablers;
- (B) explain client server applications;

(C) articulate the advantages and disadvantages to client-side processing;

(D) identify security issues related to client-side processing;

(E) use standard scripting languages to facilitate interactivity;

(F) identify characteristics of various scripting languages; and

(G) demonstrate the ability to construct secure transaction interfaces from the web server to the customer.

(10) The student employs knowledge of web administration to develop and maintain web applications. The student is expected to:

(A) compare the advantages and disadvantages of running a personal server versus using a server provider;

(B) explain how to use advanced communication protocols;

(C) demonstrate an understanding of and compliance with Transport Control Protocol/Internet Protocol;

(D) identify hardware and software requirements for web servers;

(E) evaluate server providers;

(F) participate in the process of establishing a domain name;

(G) simulate the administration of web servers, including uploading and managing files;

(H) collect and analyze usage statistics;

(I) maintain documentation of the server environment such as specifications, passwords, and software versions;

(J) understand server backup and restoration of software features; and

(K) propose security measures to protect web servers from electronic threats such as unauthorized access and negative intentions.

(11) The student evaluates a problem and creates a written plan of action for meeting client requirements. The student is expected to:

(A) communicate with clients to analyze requirements to meet needs;

(B) document all necessary design properties;

(C) identify tools and resources to complete the job;

(D) identify and address risks;

(E) develop and use a timeline task list such as critical milestones, potential challenges, and interdependencies; and

(F) use various methods to evaluate the progress of the plan and modify as necessary.

(12) The student creates and implements a written plan of action in the development of a web product. The student is expected to:

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(A) create and simulate the publication of a multipage web product using client required content and web design concepts;

(B) develop a test plan for a multipage web product for testing usability, effectiveness, reliability, and customer acceptance;

(C) explain the quality assurance process; and

(D) develop and implement a quality assurance plan.

Research in Information Technology Solutions

(1) The student demonstrates the necessary skills for career development, maintenance of employability, and successful completion of course outcomes. The student is expected to:

(A) identify and demonstrate positive work behaviors that enhance employability and job advancement such as regular attendance, promptness, attention to proper attire, maintenance of a clean and safe work environment, appropriate voice, and pride in work;

(B) identify and demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, listening attentively to speakers, and willingness to learn new knowledge and skills;

(C) employ effective reading and writing skills;

(D) employ effective verbal and nonverbal communication skills;

(E) solve problems and think critically;

(F) demonstrate leadership skills and function effectively as a team member;

(G) identify and implement proper safety procedures;

(H) demonstrate an understanding of legal and ethical responsibilities in relation to the field of information technology; and

(I) demonstrate planning and time-management skills such as project management and storyboarding.

(2) The student identifies various employment opportunities in the information technology field. The student is expected to:

(A) improve on a personal career plan along with education, job skills, and experience necessary to achieve career goals;

(B) develop a resumé and portfolio appropriate to chosen career plan, including letters of recommendation; and

(C) illustrate interview skills for successful job placement.

(3) The student applies communication, mathematics, English, and science knowledge and skills to research and develop projects. The student is expected to:

(A) demonstrate proper use of written, verbal, and visual communication techniques consistent with information technology industry standards;

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(B) demonstrate proper use of mathematics concepts in the development of products or services; and

(C) demonstrate proper use of science principles in the development of products or services.

(4) The student uses a systems approach for conducting technological research to discover a problem in the field of information technology with the appropriate supervision and guidance. The student is expected to:

(A) identify a problem relating to information technology; and

(B) describe and use the approach for conducting a research activity.

(5) The student creates a technological solution for a problem in the field of information technology. The student is expected to:

(A) apply critical-thinking strategies to develop a solution using appropriate technologies and resources, information technology concepts, and industry standards;

(B) apply decision-making techniques to the selection of technological solutions; and

(C) explain how the proposed technological solution will resolve the problem.

(6) The student designs, creates, and implements a product or service that addresses a problem in the field of information technology and incorporates the solution. The student is expected to:

(A) work closely with a mentor throughout the design, creation, and implementation process;

(B) develop a product or service that meets a specified need following a problem-solving strategy;

(C) identify areas where quality, reliability, and safety can be designed into a product or service;

(D) develop and implement a security management plan to address security requirements;

(E) develop a sustainability plan for the product or service;

(F) develop an evaluation method for analyzing the effect of the product or service on client satisfaction and problem resolution;

(G) develop a project portfolio that documents the research and development process; and

(H) present the portfolio to a panel of professionals using formal presentation skills.

(7) The student creates a personal portfolio. The student is expected to:

(A) create a portfolio that documents all projects and accomplishments such as academics, volunteer experience, employment experience, awards, and certifications;

(B) organize and prioritize information within the portfolio; and

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(C) use written, verbal, and visual communication techniques consistent with information technology industry standards.