

Fundamentals of Computer Science

Subject: Career and Technical Education

Grade: 09

Expectations: 39

Breakouts: 97

(a) Introduction.

1. Career and technical education instruction provides content aligned with challenging academic standards, industry-relevant technical knowledge, and college and career readiness skills for students to further their education and succeed in current and emerging professions.
2. The Science, Technology, Engineering, and Mathematics (STEM) Career Cluster focuses on planning, managing, and providing scientific research and professional and technical services such as laboratory and testing services and research and development services.
3. Fundamentals of Computer Science is intended as a first course for those students just beginning the study of computer science. Students will learn about the computing tools that are used every day. Students will foster their creativity and innovation through opportunities to design, implement, and present solutions to real-world problems. Students will collaborate and use computer science concepts to access, analyze, and evaluate information needed to solve problems. Students will learn computational thinking, problem-solving, and reasoning skills that are the foundation of computer science. By using computer science knowledge and skills that support the work of individuals and groups in solving problems, students will select the technology appropriate for the task, synthesize knowledge, create solutions, and evaluate the results. Students will learn digital citizenship by researching current laws, regulations, and best practices and by practicing integrity and respect. Students will gain an understanding of the principles of computer science through the study of technology operations and concepts.
4. Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.
5. Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(b) Knowledge and Skills Statements

- (1) Employability. The student identifies various employment opportunities in the computer science field. The student is expected to:
 - (A) identify job and internship opportunities and accompanying job duties and tasks and contact one or more companies or organizations to explore career opportunities;
 - (i) identify job opportunities
 - (ii) identify internship opportunities
 - (iii) identify accompanying job duties
 - (iv) identify accompanying job tasks
 - (v) contact one or more companies or organizations to explore career opportunities

- (B) examine the role of certifications, resumes, and portfolios in the computer science profession;
 - (i) examine the role of certifications in the computer science profession
 - (ii) examine the role of resumes in the computer science profession
 - (iii) examine the role of portfolios in the computer science profession
 - (C) employ effective technical reading and writing skills;
 - (i) employ effective technical reading skills
 - (ii) employ effective technical writing skills
 - (D) employ effective verbal and non-verbal communication skills;
 - (i) employ effective verbal communication skills
 - (ii) employ effective non-verbal communication skills
 - (E) solve problems and think critically;
 - (i) solve problems
 - (ii) think critically
 - (F) demonstrate leadership skills and function effectively as a team member;
 - (i) demonstrate leadership skills
 - (ii) function effectively as a team member
 - (G) demonstrate an understanding of legal and ethical responsibilities in relation to the field of computer science;
 - (i) demonstrate an understanding of legal responsibilities in relation to the field of computer science
 - (ii) demonstrate an understanding of ethical responsibilities in relation to the field of computer science
 - (H) demonstrate planning and time-management skills; and
 - (i) demonstrate planning skills
 - (ii) demonstrate time-management skills
 - (I) compare university computer science programs.
 - (i) compare university computer science programs
- (2) Creativity and innovation. The student develops products and generates new knowledge, understanding, and skills. The student is expected to:
- (A) investigate and explore various career opportunities within the computer science field and report findings through various media;
 - (i) investigate various career opportunities within the computer science field
 - (ii) explore various career opportunities within the computer science field
 - (iii) report findings [of career opportunities] through various media
 - (B) create algorithms for the solution of various problems;
 - (i) create algorithms for the solution of various problems

- (C) discuss methods and create and publish web pages using a web-based language such as HTML, Java Script, or XML; and
 - (i) discuss methods [of] using a web-based language
 - (ii) create web pages using a web-based language
 - (iii) publish web pages using a web-based language
 - (D) use generally accepted design standards for spacing, fonts, and color schemes to create functional user interfaces, including static and interactive screens.
 - (i) use generally accepted design standards for spacing to create functional user interfaces, including static screens
 - (ii) use generally accepted design standards for spacing to create functional user interfaces, including interactive screens
 - (iii) use generally accepted design standards for fonts to create functional user interfaces, including static screens
 - (iv) use generally accepted design standards for fonts to create functional user interfaces, including interactive screens
 - (v) use generally accepted design standards for color schemes to create functional user interfaces, including static screens
 - (vi) use generally accepted design standards for color schemes to create functional user interfaces, including interactive screens
- (3) Communication and collaboration. The student communicates and collaborates with peers to contribute to his or her own learning and the learning of others. The student is expected to:
- (A) seek and respond to advice or feedback from peers, educators, or professionals when evaluating problem solutions;
 - (i) seek advice or feedback from peers, educators, or professionals when evaluating problem solutions
 - (ii) respond to advice or feedback from peers, educators, or professionals when evaluating problem solutions
 - (B) debug and solve problems using reference materials and effective strategies; and
 - (i) debug problems using reference materials
 - (ii) debug problems using effective strategies
 - (iii) solve problems using reference materials
 - (iv) solve problems using effective strategies
 - (C) publish information in a variety of ways such as print, monitor display, web pages, or video.
 - (i) publish information in a variety of ways
- (4) Critical thinking, problem solving, and decision making. The student uses appropriate strategies to analyze problems and design algorithms. The student is expected to:
- (A) demonstrate the ability to insert external standalone objects such as scripts or widgets into web pages;
 - (i) demonstrate the ability to insert external standalone objects into web pages

- (B) communicate an understanding of binary representation of data in computer systems, perform conversions between decimal and binary number systems, and count in binary number systems;
 - (i) communicate an understanding of binary representation of data in computer systems
 - (ii) perform conversions between decimal and binary number systems
 - (iii) count in binary number systems
- (C) identify a problem's description, purpose, and goals;
 - (i) identify a problem's description
 - (ii) identify a problem's purpose
 - (iii) identify a problem's goals
- (D) demonstrate coding proficiency in a programming language by developing solutions that create stories, games, and animations;
 - (i) demonstrate coding proficiency in a programming language by developing solutions that create stories
 - (ii) demonstrate coding proficiency in a programming language by developing solutions that create games
 - (iii) demonstrate coding proficiency in a programming language by developing solutions that create animations
- (E) identify and use the appropriate data type to properly represent the data in a program problem solution;
 - (i) identify the appropriate data type to properly represent the data in a program problem solution
 - (ii) use the appropriate data type to properly represent the data in a program problem solution
- (F) communicate an understanding of and use variables within a programmed story, game, or animation;
 - (i) communicate an understanding of variables within a programmed story, game, or animation
 - (ii) use variables within a programmed story, game, or animation
- (G) use arithmetic operators to create mathematical expressions, including addition, subtraction, multiplication, real division, integer division, and modulus division;
 - (i) use arithmetic operators to create mathematical expressions, including addition
 - (ii) use arithmetic operators to create mathematical expressions, including subtraction
 - (iii) use arithmetic operators to create mathematical expressions, including multiplication
 - (iv) use arithmetic operators to create mathematical expressions, including real division
 - (v) use arithmetic operators to create mathematical expressions, including integer division
 - (vi) use arithmetic operators to create mathematical expressions, including modulus division
- (H) communicate an understanding of and use sequence within a programmed story, game, or animation;
 - (i) communicate an understanding of sequence within a programmed story, game, or animation
 - (ii) use sequence within a programmed story, game, or animation

- (I) communicate an understanding of and use conditional statements within a programmed story, game, or animation;
 - (i) communicate an understanding of conditional statements within a programmed story, game, or animation
 - (ii) use conditional statements within a programmed story, game, or animation
 - (J) communicate an understanding of and use iteration within a programmed story, game, or animation;
 - (i) communicate an understanding of iteration within a programmed story, game, or animation
 - (ii) use iteration within a programmed story, game, or animation
 - (K) use random numbers within a programmed story, game, or animation; and
 - (i) use random numbers within a programmed story, game, or animation
 - (L) test program solutions by investigating intended outcomes.
 - (i) test program solutions by investigating intended outcomes
- (5) Digital citizenship. The student explores and understands safety, legal, cultural, and societal issues relating to the use of technology and information. The student is expected to:
- (A) discuss privacy and copyright laws and model ethical acquisition of digital information by citing sources using established methods;
 - (i) discuss privacy laws
 - (ii) discuss copyright laws
 - (iii) model ethical acquisition of digital information by citing sources using established methods
 - (B) compare various non-copyright asset sharing options such as open source, freeware, and public domain;
 - (i) compare various non-copyright asset sharing options
 - (C) demonstrate proper digital etiquette and knowledge of acceptable use policies when using networks;
 - (i) demonstrate proper digital etiquette when using networks
 - (ii) demonstrate knowledge of acceptable use policies when using networks
 - (D) explain the value of strong passwords and virus detection and prevention for privacy and security;
 - (i) explain the value of strong passwords
 - (ii) explain the value of virus detection
 - (iii) explain the value of virus prevention for privacy and security
 - (E) discuss and give examples of the impact of computing and computing-related advancements on society; and
 - (i) discuss examples of the impact of computing on society
 - (ii) discuss examples of the impact of computing-related advancements on society
 - (iii) give examples of the impact of computing on society
 - (iv) give examples of the impact of computing-related advancements on society

- (F) analyze how electronic media can affect reliability of information.
 - (i) analyze how electronic media can affect reliability of information
- (6) Technology operations and concepts. The student understands technology concepts, systems, and operations as they apply to computer science. The student is expected to:
 - (A) identify and explain the function of basic computer components, including a central processing unit (CPU), storage, and peripheral devices;
 - (i) identify the function of basic computer components, including a central processing unit (CPU)
 - (ii) identify the function of basic computer components, including storage devices
 - (iii) identify the function of basic computer components, including peripheral devices
 - (iv) explain the function of basic computer components, including a central processing unit (CPU)
 - (v) explain the function of basic computer components, including storage devices
 - (vi) explain the function of basic computer components, including peripheral devices
 - (B) use system tools, including appropriate file management;
 - (i) use system tools, including appropriate file management
 - (C) compare different operating systems;
 - (i) compare different operating systems
 - (D) describe the differences between an application and an operating system; and
 - (i) describe the differences between an application and an operating system
 - (E) use various input, processing, output, and primary/secondary storage devices.
 - (i) use various input devices
 - (ii) use various processing devices
 - (iii) use various output devices
 - (iv) use various primary storage devices
 - (v) use various secondary storage devices