Chapter 127. Texas Essential Knowledge and Skills for Career Development and Career and Technical Education

Subchapter M. Information Technology

Statutory Authority: The provisions of this Subchapter M issued Texas Education Code, §§7.102(c)(4); 28.002(a), (c), (n), and (o); and 28.025(a), (b-2), and (b-17), unless otherwise noted.

§127.671. Principles of Information Technology (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 9 and 10. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) In Principles of Information Technology, students will develop computer literacy skills to adapt to emerging technologies used in the global marketplace. Students will implement personal and interpersonal skills to prepare for a rapidly evolving workplace environment. Students will enhance reading, writing, computing, communication, and reasoning skills and apply them to the information technology environment.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student identifies various employment opportunities in the IT 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) describe the functions of resumes and portfolios.

(2) The student uses evolving and emerging technologies to exchange information. The student is expected to:

(A) identify and describe functions of various evolving and emerging technologies;

(B) send and receive text information and file attachments using electronic methods such as email, electronic bulletin boards, and instant message services;

(C) demonstrate effective Internet search strategies, including keywords and Boolean logic, using various available search engines;

(D) identify the various components of a Uniform Resource Locator;

(E) demonstrate ability to effectively test acquired information from the Internet for accuracy, relevance, and validity;

(F) explain issues concerning computer-based threats such as computer viruses, malware, and hacking; and

(G) explain issues concerning Internet safety such as identity theft, online predators, cyber-bullying, and phishing.

(3) The student demonstrates knowledge of the hardware components associated with information systems. The student is expected to:

(A) identify major hardware components and their functions;

(B) use available reference tools as appropriate; and

(C) connect and use a variety of peripheral devices such as mouse, keyboard, microphone, digital camera, and printer.

(4) The student demonstrates knowledge of the different software associated with information systems. The student is expected to:

(A) differentiate between systems and application software;

(B) identify and explain major operating system fundamentals and components such as disk operations, graphical user interface components, and hardware drivers;

(C) explain the purpose of file types across software products;

(D) demonstrate use of computer numbering systems and internal data representation such as identifying the hexadecimal value of a color;

(E) compare and contrast open source and proprietary software;

(F) explain use of system management tools;

(G) apply proper file management techniques such as creating, naming, organizing, copying, moving, and deleting files;

(H) use appropriate file protection and security; and

(I) explain the process for discovering, quarantining, and removing viruses from a computer system.

(5) The student analyzes network systems. The student is expected to:

(A) identify hardware associated with telecommunications and data networking such as servers, routers, switches, and network connectors;

(B) identify and describe various types of networks such as peer-to-peer, local area networks, wide area networks, wireless, and Ethernet;

(C) identify functions of network operating systems; and

(D) explain troubleshooting techniques for various network connection issues.

(6) The student applies word-processing technology. The student is expected to:

(A) identify the terminology associated with word-processing software;

(B) edit a variety of text documents using functions such as pagination, appropriate white space, tab settings, and font style, size, and color; and

(C) create professional documents such as memorandums, technical manuals, or proposals using advanced word-processing features.

(7) The student applies spreadsheet technology. The student is expected to:

(A) identify the terminology associated with spreadsheet software;

(B) use numerical content to perform mathematical calculations;

(C) use student-created and preprogrammed functions to produce documents such as budget, payroll, statistical tables, and personal checkbook register;

(D) identify, generate, and describe the function of comma separated value files;

(E) create and analyze spreadsheets incorporating advanced features such as lookup tables, nested IF statements, subtotals, cell protection conditional formatting, charts, and graphs; and

(F) perform sorting, searching, and data filtering in documents.

(8) The student explores computer programming concepts. The student is expected to:

(A) identify the function of compilers and interpreters;

(B) explain the difference between the operation of compilers and interpreters;

(C) identify various computer languages and how the languages are used in software development;

(D) recognize data representation in software development such as string, numeric, character, integer, and date;

(E) identify and explain the concept of algorithms; and

(F) describe the flow of a structured algorithm, including linear and iterative instructions such as using a flow chart.

(9) The student explores database technology. The student is expected to:

(A) identify the terminology associated with database software and database functions;

(B) explore the application of databases;

(C) identify and explain the purpose and elements of a query language;

(D) identify and explain the purpose of fields and records; and

(E) describe the process of constructing a query, including multiple search parameters.

(10) The student applies presentation management technology. The student is expected to:

(A) identify the terminology and functions of presentation software; and

(B) create, save, edit, and produce presentations incorporating advanced features such as links, hyperlinks, audio, and graphics.

(11) The student applies design and web publishing techniques. The student is expected to:

(A) identify the terminology associated with web page development and interactive media;

(B) identify and explain design elements such as typeface, color, shape, texture, space, and form;

(C) identify and explain design principles such as unity, harmony, balance, scale, and contrast;

(D) identify and explain common elements of Hyper Text Markup Language (HTML) such as tags, stylesheets, and hyperlinks; and

(E) create a web page containing links, graphics, and text using appropriate design principles.

(12) The student understands and demonstrates legal and ethical procedures as they apply to the use of information technology. The student is expected to:

(A) explain and demonstrate ethical use of technology and online resources;

(B) adhere to intellectual property laws;

(C) explain the concept of intellectual property laws, including copyright, trademarks, and patents and consequences of violating each type of law;

(D) examine the consequences of plagiarism;

(E) identify and explain unethical practices such as hacking, online piracy, and data vandalism; and

(F) demonstrate ethical use of online resources, including citation of source.

(13) The student applies project management skills to information technology projects. The student is expected to:

(A) identify and demonstrate planning strategies such as storyboarding;

(B) identify phases of project management, including initiating, planning, executing, monitoring and controlling, and closing a project.

Source: The provisions of this §127.671 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.672. Fundamentals of Computer Science (One Credit), Adopted 2022.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2023-2024 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 9-12. Students shall be awarded one credit for successful completion of this course.

(c) 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 Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration 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 organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(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;

(B) examine the role of certifications, resumes, and portfolios in the computer science profession;

(C) employ effective technical reading and writing skills;

(D) employ effective verbal and non-verbal communication skills;

(E) solve problems and think critically;

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

(G) demonstrate an understanding of legal and ethical responsibilities in relation to the field of computer science;

(H) demonstrate planning and time-management skills; and

(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;

(B) 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

(D) use generally accepted design standards for spacing, fonts, and color schemes to create functional user interfaces, including static and 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;

(B) debug and solve problems using reference materials and effective strategies; and

(C) publish information in a variety of ways such as print, monitor display, web pages, or video.

(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;

(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;

(C) identify a problem's description, purpose, and goals;

(D) demonstrate coding proficiency in a programming language by developing solutions that create stories, games, and animations;

(E) identify and 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;

(G) use arithmetic operators to create mathematical expressions, including addition, subtraction, multiplication, real division, integer division, and modulus division;

(H) communicate an understanding of and 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;

(J) communicate an understanding of and use iteration within a programmed story, game, or animation;

(K) use random numbers within a programmed story, game, or animation; and

(L) 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;

(B) compare various non-copyright asset sharing options such as open source, freeware, and public domain;

(C) demonstrate proper digital etiquette and knowledge of acceptable use policies when using networks;

(D) explain the value of strong passwords and virus detection and prevention for privacy and security;

(E) discuss and give examples of the impact of computing and computing-related advancements on society; and

(F) 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;

(B) use system tools, including appropriate file management;

(C) compare different operating systems;

(D) describe the differences between an application and an operating system; and

(E) use various input, processing, output, and primary/secondary storage devices.

Source: The provisions of this §127.672 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.673. Computer Science I (One Credit), Adopted 2022.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2024-2025 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 9-12. Prerequisite or corequisite: Algebra I. Students shall be awarded one credit for successful completion of this course.

(c) 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 Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) Computer Science I will foster students' creativity and innovation by presenting opportunities to design, implement, and present meaningful programs through a variety of media. Students will collaborate with one another, their instructor, and various electronic communities to solve the problems presented throughout the course. Through computational thinking and data analysis, students will identify task requirements, plan search strategies, and use computer science concepts to access, analyze, and evaluate information needed to solve problems. 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, systems, and concepts.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(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;

(B) examine the role of certifications, resumes, and portfolios in the computer science profession;

(C) employ effective technical reading and writing skills;

(D) employ effective verbal and non-verbal communication skills;

(E) solve problems and think critically;

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

(G) communicate an understanding of legal and ethical responsibilities in relation to the field of computer science;

(H) demonstrate planning and time-management skills; and

(I) compare university computer science programs.

(2) 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) participate in learning communities as a learner, initiator, contributor, and teacher/mentor; and

(B) seek and respond to advice from peers, educators, or professionals when evaluating quality and accuracy of the student's product.

(3) Programming style and presentation. The student utilizes proper programming style and develops appropriate visual presentation of data, input, and output. The student is expected to:

(A) create and properly label and display output;

(B) create interactive input interfaces, with relevant user prompts, to acquire data from a user such as console displays or Graphical User Interfaces (GUIs);

(C) write programs with proper programming style to enhance the readability and functionality of a code by using descriptive identifiers, internal comments, white space, spacing, indentation, and a standardized program style;

(D) format data displays using standard formatting styles; and

(E) display simple vector graphics using lines, circles, and rectangles.

(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) use program design problem-solving strategies such as flowchart or pseudocode to create program solutions;

(B) create a high-level program plan using a visual tool such as a flowchart or graphic organizer;

(C) identify the tasks and subtasks needed to solve a problem;

(D) identify the data types and objects needed to solve a problem;

(E) identify reusable components from existing code;

(F) design a solution to a problem;

(G) code a solution from a program design;

(H) identify error types, including syntax, lexical, run time, and logic;

(I) test program solutions with valid and invalid test data and analyze resulting behavior;

(J) debug and solve problems using error messages, reference materials, language documentation, and effective strategies;

(K) create and implement common algorithms such as finding greatest common divisor, finding the biggest number out of three, finding primes, making change, and finding the average;

(L) create program solutions that address basic error handling such as preventing division by zero and type mismatch;

(M) select the most appropriate construct for a defined problem;

(N) create program solutions by using the arithmetic operators to create mathematical expressions, including addition, subtraction, multiplication, real division, integer division, and modulus division;

(O) create program solutions to problems using available mathematics library functions or operators, including absolute value, round, power, square, and square root;

(P) develop program solutions that use assignment;

(Q) develop sequential algorithms to solve non-branching and non-iterative problems;

(R) develop algorithms to decision-making problems using branching control statements;

(S) develop iterative algorithms and code programs to solve practical problems;

(T) demonstrate the appropriate use of the relational operators;

(U) demonstrate the appropriate use of the logical operators; and

(V) generate and use random numbers.

(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 and explain intellectual property, privacy, sharing of information, copyright laws, and software licensing agreements;

(B) practice ethical acquisition and use of digital information;

(C) demonstrate proper digital etiquette, responsible use of software, and knowledge of acceptable use policies;

(D) investigate privacy and security measures, including strong passwords, pass phrases, and other methods of authentication and virus detection and prevention; and

(E) investigate computing and computing-related advancements and the social and ethical ramifications of computer usage.

(6) Technology operations, systems, and concepts. The student understands technology concepts, systems, and operations as they apply to computer science. The student is expected to:

(A) identify and describe the function of major hardware components, including primary and secondary memory, a central processing unit (CPU), and peripherals;

(B) differentiate between current programming languages, discuss the general purpose for each language, and demonstrate knowledge of specific programming terminology and concepts and types of software development applications;

(C) differentiate between a high-level compiled language and an interpreted language;

(D) identify and use concepts of object-oriented design;

(E) differentiate between local and global scope access variable declarations;

(F) encapsulate data and associated subroutines into an abstract data type;

(G) create subroutines that do not return values with and without the use of arguments and parameters;

(H) create subroutines that return typed values with and without the use of arguments and parameters;

(I) create calls to processes passing arguments that match parameters by number, type, and position;

(J) compare data elements using logical and relational operators;

(K) identify and convert binary representation of numeric and nonnumeric data in computer systems using American Standard Code for Information Interchange (ASCII) or Unicode;

(L) identify finite limits of numeric data such as integer wrap around and floating point precision;

(M) perform numerical conversions between the decimal and binary number systems and count in the binary number system;

(N) choose, identify, and use the appropriate data types for integer, real, and Boolean data when writing program solutions;

(O) analyze the concept of a variable, including primitives and objects;

(P) represent and manipulate text data, including concatenation and other string functions;

(Q) identify and use the structured data type of one-dimensional arrays to traverse, search, and modify data;

(R) choose, identify, and use the appropriate data type or structure to properly represent the data in a program problem solution; and

(S) compare strongly typed and un-typed programming languages.

Source: The provisions of this §127.673 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.674. Computer Science II (One Credit), Adopted 2022.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2024-2025 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Prerequisites: Algebra I and Computer Science I or AP Computer Science Principles. Students shall be awarded one credit for successful completion of this course.

(c) 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 Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) Computer Science II will foster students' creativity and innovation by presenting opportunities to design, implement, and present meaningful programs through a variety of media. Students will collaborate with one another, their instructor, and various electronic communities to solve the problems presented throughout the course. Through computational thinking and data analysis, students will identify task requirements, plan search strategies, and use computer science concepts to access, analyze, and evaluate information needed to solve problems. 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 gain an understanding of computer science through the study of technology operations, systems, and concepts.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(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;

(B) examine the role of certifications, resumes, and portfolios in the computer science profession;

(C) employ effective technical reading and writing skills;

(D) employ effective verbal and non-verbal communication skills;

(E) solve problems and think critically;

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

(G) identify legal and ethical responsibilities in relation to the field of computer science;

(H) demonstrate planning and time-management skills; and

(I) compare university computer science programs.

(2) Creativity and innovation. The student develops products and generates new understandings by extending existing knowledge. The student is expected to:

(A) use program design problem-solving strategies to create program solutions;

(B) read, analyze, and modify programs and their accompanying documentation such as an application programming interface (API), internal code comments, external documentation, or readme files;

(C) follow a systematic problem-solving process that identifies the purpose and goals, the data types and objects needed, and the subtasks to be performed;

(D) compare design methodologies and implementation techniques such as top-down, bottom-up, and black box;

(E) trace a program, including inheritance and black box programming;

(F) choose, identify, and use the appropriate abstract data type, advanced data structure, and supporting algorithms to properly represent the data in a program problem solution; and

(G) use object-oriented programming development methodology, including data abstraction, encapsulation with information hiding, inheritance, and procedural abstraction in program development.

(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) use the principles of software development to work in software design teams;

(B) break a problem statement into specific solution requirements;

(C) create a program development plan;

(D) code part of a solution from a program development plan while a partner codes the remaining part;

(E) collaborate with a team to test a solution, including boundary and standard cases; and

(F) develop presentations to report the solution findings.

(4) Data literacy and management. The student locates, analyzes, processes, and organizes data. The student is expected to:

(A) use programming file structure and file access for required resources;

(B) acquire and process information from text files, including files of known and unknown sizes;

(C) manipulate data using string processing;

(D) manipulate data values by casting between data types;

(E) use the structured data type of one-dimensional arrays to traverse, search, modify, insert, and delete data;

(F) identify and use the structured data type of two-dimensional arrays to traverse, search, modify, insert, and delete data;

(G) identify and use a list object data structure to traverse, search, insert, and delete data; and

(H) differentiate between categories of programming languages, including machine, assembly, high-level compiled, high-level interpreted, and scripted.

(5) Critical thinking, problem solving, and decision making. The student uses appropriate strategies to analyze problems and design algorithms. The student is expected to:

(A) develop sequential algorithms using branching control statements, including nested structures, to create solutions to decision-making problems;

(B) develop choice algorithms using selection control statements based on ordinal values;

(C) demonstrate the appropriate use of short-circuit evaluation in certain situations;

(D) use Boolean algebra, including De Morgan's Law, to evaluate and simplify logical expressions;

(E) develop iterative algorithms using nested loops;

(F) identify, trace, and appropriately use recursion in programming solutions, including algebraic computations;

(G) trace, construct, evaluate, and compare search algorithms, including linear searching and binary searching;

(H) identify, describe, trace, evaluate, and compare standard sorting algorithms, including selection sort, bubble sort, insertion sort, and merge sort;

(I) measure time and space efficiency of various sorting algorithms, including analyzing algorithms using "big-O" notation for best, average, and worst-case data patterns;

(J) develop algorithms to solve various problems such as factoring, summing a series, finding the roots of a quadratic equation, and generating Fibonacci numbers;

(K) test program solutions by investigating boundary conditions; testing classes, methods, and libraries in isolation; and performing stepwise refinement;

(L) identify and debug compile, syntax, runtime, and logic errors;

(M) compare efficiency of search and sort algorithms by using informal runtime comparisons, exact calculation of statement execution counts, and theoretical efficiency values using "big-O" notation, including worst-case, best-case, and average-case time/space analysis;

(N) count, convert, and perform mathematical operations in the decimal, binary, octal, and hexadecimal number systems;

(O) identify maximum integer boundary, minimum integer boundary, imprecision of real number representations, and round-off errors;

(P) create program solutions to problems using a mathematics library;

(Q) use random number generator algorithms to create simulations;

(R) use composition and inheritance relationships to identify and create class definitions and relationships;

(S) explain and use object relationships between defined classes, abstract classes, and interfaces;

(T) create object-oriented class definitions and declarations using variables, constants, methods, parameters, and interface implementations;

(U) create adaptive behaviors using polymorphism;

(V) use reference variables for object and string data types;

(W) use value and reference parameters appropriately in method definitions and method calls;

(X) implement access scope modifiers;

(Y) use object comparison for content quality;

(Z) duplicate objects using the appropriate deep or shallow copy;

(AA) apply functional decomposition to a program solution;

(BB) create objects from class definitions through instantiation; and

(CC) examine and mutate the properties of an object using accessors and modifiers.

Source: The provisions of this §127.674 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.675. Computer Science III (One Credit), Adopted 2022.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2023-2024 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisite: Computer Science II, Advanced Placement (AP) Computer Science A, or International Baccalaureate (IB) Computer Science Standard Level or IB Computer Science Higher Level. Students shall be awarded one credit for successful completion of this course.

(c) 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 Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) Computer Science III will foster students' creativity and innovation by presenting opportunities to design, implement, and present meaningful programs through a variety of media. Students will collaborate with one another, their instructor, and various electronic communities to solve the problems presented throughout the course. Through computational thinking and data analysis, students will identify task requirements, plan search strategies, and use computer science concepts to access, analyze, and evaluate information needed to solve problems. 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 gain an understanding of advanced computer science data structures through the study of technology operations, systems, and concepts.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(6) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(d) Knowledge and skills.

(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;

(B) examine the role of certifications, resumes, and portfolios in the computer science profession;

(C) employ effective technical reading and writing skills;

(D) employ effective verbal and non-verbal communication skills;

(E) solve problems and think critically;

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

(G) demonstrate an understanding of legal and ethical responsibilities in relation to the field of computer science;

(H) demonstrate planning and time-management skills; and

(I) compare university computer science programs.

(2) Creativity and innovation. The student develops products and generates new understandings by extending existing knowledge. The student is expected to:

(A) apply object-oriented programming, including data abstraction, encapsulation, inheritance, and polymorphism, to manage the complexity of a project;

(B) design and implement a class hierarchy;

(C) read and write class specifications using visual organizers, including Unified Modeling Language;

(D) identify, describe, evaluate, compare, and implement standard sorting algorithms that perform sorting operations on data structures, including quick sort and heap sort; and

(E) identify and use the appropriate abstract data type, advanced data structure, and supporting algorithms to properly represent the data in a program problem solution.

(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) use networked tools for file management and collaboration; and

(B) work in software design teams.

(4) Data literacy and management. The student locates, analyzes, processes, and organizes data. The student is expected to:

(A) identify and use two-dimensional ragged arrays to traverse, search, modify, insert, and delete data;

(B) describe and demonstrate proper linked list management, including maintaining the head and safe addition and deletion of linked objects;

(C) create or trace program solutions using a linked-list data structure, including unordered single, ordered single, double, and circular linked;

(D) describe composite data structures, including a linked list of linked lists;

(E) create or trace program solutions using stacks, queues, trees, heaps, priority queues, graph theory, and enumerated data types;

(F) create or trace program solutions using sets, including hash and tree-based data structures;

(G) create or trace program solutions using map style data structures; and

(H) write and modify text file data.

(5) Critical thinking, problem solving, and decision making. The student uses appropriate strategies to analyze problems and design algorithms. The student is expected to:

(A) evaluate expressions using bitwise operators;

(B) evaluate expressions using the ternary operator;

(C) identify, trace, and appropriately use recursion in programming solutions, including processing binary trees;

(D) create or trace program solutions using hashing;

(E) explore common algorithms such as matrix addition and multiplication, fractals, Towers of Hanoi, and magic square; and

(F) create program solutions that exhibit robust behavior by recognizing and avoiding runtime errors and handling anticipated errors.

(6) Testing and documentation. The student demonstrates appropriate documentation and testing practices. The student is expected to:

(A) use appropriate formatting and write documentation to support code maintenance, including pre- and post-condition statements;

(B) write program assumptions in the form of assertions;

(C) write a Boolean expression to test a program assertion; and

(D) construct assertions to make explicit program invariants.

(7) Practical application of technology. The student utilizes technology concepts, systems, and operations as they apply to computer science. The student is expected to:

(A) analyze and create computer program workflow charts and basic system diagrams, documenting system functions, features, and operations;

(B) gather requirements, design, and implement a process by which programs can interact with each other such as using interfaces;

(C) create simple programs using a low-level language such as assembly;

(D) create discovery programs in a high-level language;

(E) create scripts for an operating system;

(F) explore industry best practices for secure programming; and

(G) explore emerging industry or technology trends.

Source: The provisions of this §127.675 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.676. Foundations of Cybersecurity (One Credit), Adopted 2022.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2023-2024 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 9-12. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards, industry and relevant technical knowledge, and college and career readiness skills for students to further their education and succeed in current and emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) Cybersecurity is a critical discipline concerned with safeguarding computers, networks, programs, and data from unauthorized access. As a field, it has gained prominence with the expansion of a globally connected society. As computing has become more sophisticated, so too have the abilities of adversaries looking to penetrate networks and access systems and sensitive information. Cybersecurity professionals prevent, detect, and respond to minimize disruptions to governments, organizations, and individuals.

(4) In the Foundations of Cybersecurity course, students will develop the knowledge and skills needed to explore fundamental concepts related to the ethics, laws, and operations of cybersecurity. Students will examine trends and operations of cyberattacks, threats, and vulnerabilities. Students will review and explore security policies designed to mitigate risks. The skills obtained in this course prepare students for additional study in cybersecurity. A variety of courses are available to students interested in this field. Foundations of Cybersecurity may serve as an introductory course in this field of study.

(5) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(6) 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.

(d) Knowledge and skills.

(1) Professional awareness. The student identifies various employment opportunities and requirements in the cybersecurity field. The student is expected to:

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

(B) research careers in cybersecurity and information security and develop professional profiles that match education and job skills required for obtaining a job in both the public and private sectors;

(C) identify and discuss certifications for cybersecurity-related careers; and

(D) explain the different types of services and roles found within a cybersecurity functional area such as a security operations center (SOC).

(2) Ethics and laws. The student understands ethical and current legal standards, rights and restrictions governing technology, technology systems, digital media, and the use of social media. The student is expected to:

(A) demonstrate and advocate for ethical and legal behaviors both online and offline among peers, family, community, and employers;

(B) investigate and analyze local, state, national, and international cybersecurity laws such as the USA PATRIOT Act of 2001, General Data Protection Regulation, Digital Millennium Copyright Act, Computer Fraud and Abuse Act, and Health Insurance Portability and Accountability Act of 1996 (HIPAA);

(C) investigate and analyze noteworthy incidents or events regarding cybersecurity;

(D) communicate an understanding of ethical and legal behavior when presented with various scenarios related to cybersecurity activities;

(E) define and identify tactics used in an incident such as social engineering, malware, denial of service, spoofing, and data vandalism; and

(F) identify and use appropriate methods for citing sources.

(3) Ethics and laws. The student differentiates between ethical and malicious hacking. The student is expected to:

(A) identify motivations and perspectives for hacking;

(B) distinguish between types of threat actors such as hacktivists, criminals, state-sponsored actors, and foreign governments;

(C) identify and describe the impact of cyberattacks on the global community, society, and individuals;

(D) differentiate between industry terminology for types of hackers such as black hats, white hats, and gray hats; and

(E) determine and describe possible outcomes and legal ramifications of ethical versus malicious hacking practices.

(4) Ethics and laws. The student identifies and defines cyberterrorism and counterterrorism. The student is expected to:

(A) define cyberterrorism, state-sponsored cyberterrorism, and hacktivism;

(B) compare and contrast physical terrorism and cyberterrorism, including domestic and foreign actors;

(C) define and explain intelligence gathering;

(D) explain the role of cyber defense in protecting national interests and corporations;

(E) explain the role of cyber defense in society and the global economy; and

(F) explain the importance of protecting public infrastructures such as electrical power grids, water systems, pipelines, transportation, and power generation facilities from cyberterrorism.

(5) Digital citizenship. The student understands and demonstrates the social responsibility of end users regarding significant issues related to digital technology, digital hygiene, and cyberbullying. The student is expected to:

(A) identify and understand the nature and value of privacy;

(B) analyze the positive and negative implications of a digital footprint and the maintenance and monitoring of an online presence;

(C) discuss the role and impact of technology on privacy;

(D) identify the signs, emotional effects, and legal consequences of cyberbullying and cyberstalking; and

(E) identify and discuss effective ways to deter and report cyberbullying.

(6) Digital citizenship. The student understands the implications of sharing information and access with others. The student is expected to:

(A) define personally identifiable information (PII);

(B) evaluate the risks and benefits of sharing PII;

(C) describe the impact of granting applications unnecessary permissions such as mobile devices accessing camera and contacts;

(D) describe the risks of granting third parties access to personal and proprietary data on social media and systems; and

(E) describe the risks involved with accepting Terms of Service (ToS) or End User License Agreements (EULA) without a basic understanding of the terms or agreements.

(7) Cybersecurity skills. The student understands basic cybersecurity concepts and definitions. The student is expected to:

(A) define cybersecurity and information security;

(B) identify basic risk management and risk assessment principles related to cybersecurity threats and vulnerabilities, including the Zero Trust model;

(C) explain the fundamental concepts of confidentiality, integrity, and availability (CIA triad);

(D) describe the trade-offs between convenience and security;

(E) identify and analyze cybersecurity breaches and incident responses;

(F) identify and analyze security challenges in domains such as physical, network, cloud, and web;

(G) define and discuss challenges faced by cybersecurity professionals such as internal and external threats;

(H) identify indicators of compromise such as common risks, warning signs, and alerts of compromised systems;

(I) explore and discuss the vulnerabilities of network-connected devices such as Internet of Things (IoT);

(J) use appropriate cybersecurity terminology;

(K) explain the concept of penetration testing, including tools and techniques; and

(L) explore and identify common industry frameworks such as MITRE ATT&CKTM, MITRE Engage TM, and Cyber Kill Chain, and the Diamond Model.

(8) Cybersecurity skills. The student understands and explains various types of malicious software (malware). The student is expected to:

(A) define malware, including spyware, ransomware, viruses, and rootkits;

(B) identify the transmission and function of malware such as trojan horses, worms, and viruses;

(C) discuss the impact of malware and the model of "as a service";

(D) explain the role of reverse engineering for the detection of malware and viruses; and

(E) describe free and commercial antivirus and anti-malware software also known as Endpoint Detection and Response software.

(9) Cybersecurity skills. The student understands and demonstrates knowledge of techniques and strategies to prevent a system from being compromised. The student is expected to:

(A) define system hardening;

(B) use basic system administration privileges;

(C) explain the importance of patching operating systems;

(D) explain the importance of software updates;

(E) describe standard practices to configure system services;

(F) explain the importance of backup files;

(G) research and explain standard practices for securing computers, networks, and operating systems, including the concept of least privilege; and

(H) identify vulnerabilities caused by a lack of cybersecurity awareness and training such as weaknesses posed by individuals within an organization.

(10) Cybersecurity skills. The student understands basic network operations. The student is expected to:

(A) identify basic network devices, including routers and switches;

(B) define network addressing;

(C) analyze incoming and outgoing rules for traffic passing through a firewall;

(D) identify well known ports by number and service provided, including port 22 (Secure Shell Protocol/ssh), port 80 (Hypertext Transfer Protocol/http), and port 443 (Hypertext Transfer Protocol Secure/https);

(E) identify commonly exploited ports and services, including ports 20 and 21 (File Transfer Protocol/ftp), port 23 (telnet protocol), and port 3389 (Remote Desktop Protocol/rdp); and

(F) identify common tools for monitoring ports and network traffic.

(11) Cybersecurity skills. The student identifies standard practices of system administration. The student is expected to:

(A) define what constitutes a secure password;

(B) create a secure password policy, including length, complexity, account lockout, and rotation;

(C) identify methods of password cracking such as brute force and dictionary attacks; and

(D) examine and configure security options to allow and restrict access based on user roles.

(12) Cybersecurity skills. The student demonstrates necessary steps to maintain user access on the system. The student is expected to:

(A) identify different types of user accounts and groups on an operating system;

(B) explain the fundamental concepts and standard practices related to access control, including authentication, authorization, and auditing;

(C) compare methods for single- and multi-factor authentication such as passwords, biometrics, personal identification numbers (PINs), secure tokens, and other passwordless authentication methods;

(D) define and explain the purpose and benefits of an air-gapped computer; and

(E) explain how hashes and checksums may be used to validate the integrity of transferred data.

(13) Cybersecurity skills. The student explores the field of digital forensics. The student is expected to:

(A) explain the importance of digital forensics to organizations, private citizens, and the public sector;

(B) identify the role of chain of custody in digital forensics;

(C) explain the four steps of the forensics process, including collection, examination, analysis, and reporting;

(D) identify when a digital forensics investigation is necessary;

(E) identify information that can be recovered from digital forensics investigations such as metadata and event logs; and

(F) analyze the purpose of event logs and identify suspicious activity.

(14) Cybersecurity skills. The student explores the operations of cryptography. The student is expected to:

(A) explain the purpose of cryptography and encrypting data;

(B) research historical uses of cryptography;

(C) review and explain simple cryptography methods such as shift cipher and substitution cipher;

(D) define and explain public key encryption; and

(E) compare and contrast symmetric and asymmetric encryption.

(15) Vulnerabilities, threats, and attacks. The student understands vulnerabilities, threats, and attacks. The student is expected to:

(A) explain how computer vulnerabilities leave systems open to cyberattacks;

(B) explain how users are the most common vehicle for compromising a system at the application level;

(C) define and describe vulnerability, payload, exploit, port scanning, and packet sniffing;

(D) identify internal threats to systems such as logic bombs and insider threats;

(E) define and describe cyberattacks, including man-in-the-middle, distributed denial of service, spoofing, and back-door attacks;

(F) differentiate types of social engineering techniques such as phishing; web links in email, instant messaging, social media, and other online communication with malicious links; shoulder surfing; and dumpster diving; and

(G) identify various types of application-specific attacks such as cross-site scripting and injection attacks.

(16) Vulnerabilities, threats, and attacks. The student evaluates the vulnerabilities of networks. The student is expected to:

(A) compare vulnerabilities associated with connecting devices to public and private networks;

(B) explain device vulnerabilities and security solutions on networks such as supply chain security and counterfeit products;

(C) compare and contrast protocols such as HTTP versus HTTPS;

(D) debate the broadcasting or hiding of a wireless service set identifier (SSID); and

(E) research and discuss threats such as mandatory access control (MAC) spoofing and packet sniffing.

(17) Vulnerabilities, threats, and attacks. The student analyzes threats to computer applications. The student is expected to:

(A) define application security;

(B) identify methods of application security such as secure development policies and practices;

(C) explain the purpose and function of vulnerability scanners;

(D) explain how coding errors may create system vulnerabilities such as buffer overflows and lack of input validation; and

(E) analyze the risks of distributing insecure programs.

(18) Risk assessment. The student understands risk and how risk assessment and risk management defend against attacks. The student is expected to:

(A) define commonly used risk assessment terms, including risk, asset, and inventory;

(B) identify risk management strategies, including acceptance, avoidance, transference, and mitigation; and

(C) compare and contrast risks based on an industry accepted rubric or metric such as Risk Assessment Matrix.

Source: The provisions of this §127.676 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.677. Digital Forensics (One Credit), Adopted 2022.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2023-2024 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 9-12. Prerequisite: Foundations of Cybersecurity. Students shall be awarded one credit for successful completion of this course.

(c) 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 Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) Digital forensics is a critical discipline concerned with analyzing anomalous activity on computers, networks, programs, and data. As a discipline, it has grown with the expansion of a globally connected digital society. As computing has become more sophisticated, so too have the abilities to access systems and sensitive information. Digital forensics professionals investigate and craft appropriate responses to disruptions to governments, organizations, and individuals. Whereas cybersecurity takes a proactive approach to information assurance to minimize harm, digital forensics takes a reactive approach to incident response.

(4) Digital Forensics introduces students to the knowledge and skills of digital forensics. The course provides a survey of the field of digital forensics and incident response.

(5) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(6) 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.

(d) Knowledge and skills.

(1) Employment opportunities. The student identifies various employment opportunities in the digital forensics field. The student is expected to:

(A) investigate the need for digital forensics;

(B) identify and discuss certifications for digital forensics careers;

(C) identify and describe businesses and government agencies that use digital forensics; and

(D) identify and describe the kinds of crimes investigated by digital forensics specialists.

(2) Ethics and laws. The student recognizes and analyzes ethical and current legal standards, rights, and restrictions related to digital forensics. The student is expected to:

(A) develop a plan to advocate for ethical and legal behaviors both online and offline among peers, family, community, and employers;

(B) research and discuss local, state, national, and international law such as the Electronic Communications Privacy Act of 1986, Title III (Pen Register Act); USA PATRIOT Act of 2001; and Digital Millennium Copyright Act;

(C) research and discuss historic cases or events regarding digital forensics or cybersecurity;

(D) analyze ethical and legal behavior when presented with confidential or sensitive information in various scenarios related to cybersecurity activities;

(E) analyze case studies of computer incidents;

(F) use the findings of a computer incident investigation to reconstruct a computer incident;

(G) identify and discuss intellectual property laws, issues, and use;

(H) contrast legal and illegal aspects of information gathering;

(I) contrast ethical and unethical aspects of information gathering;

(J) analyze emerging legal and societal trends affecting digital forensics; and

(K) discuss how technological changes affect applicable laws.

(3) Digital citizenship. The student understands and demonstrates the social responsibility of end users regarding digital technology, safety, digital hygiene, and cyberbullying. The student is expected to:

(A) identify and use digital information responsibly;

(B) use digital tools responsibly;

(C) identify and use valid and reliable sources of information; and

(D) gain informed consent prior to investigating incidents.

(4) Digital forensics skills. The student locates, processes, analyzes, and organizes data. The student is expected to:

(A) identify sources of data;

(B) analyze and report data collected;

(C) discuss how to maintain data integrity such as by enabling encryption;

(D) examine and describe metadata of a file; and

(E) examine and describe how multiple data sources can be used for digital forensics, including investigating malicious software (malware) and email threats.

(5) Digital forensics skills. The student understands software concepts and operations as they apply to digital forensics. The student is expected to:

(A) compare software applications as they apply to digital forensics;

(B) describe the purpose of various application types such as email, web, file sharing, security applications, and data concealment tools;

(C) identify the different purposes of data formats such as pdf, wav, jpeg, and exe;

(D) describe how application logs and metadata are used for investigations such as Security Information and Event Management (SIEM) reports;

(E) describe digital forensics tools;

(F) select the proper software tool based on appropriateness, effectiveness, and efficiency for a given digital forensics scenario;

(G) describe components of applications such as configurations settings, data, supporting files, and user interface; and

(H) describe how the "as a service" model applies to incident response.

(6) Digital forensics skills. The student understands operating systems concepts and functions as they apply to digital forensics. The student is expected to:

(A) compare various operating systems;

(B) describe file attributes, including access and creation times;

(C) describe how operating system logs are used for investigations;

(D) compare and contrast the file systems of various operating systems;

(E) compare various primary and secondary storage devices; and

(F) differentiate between volatile and non-volatile memory.

(7) Digital forensics skills. The student understands networking concepts and operations as they apply to digital forensics. The student is expected to:

(A) examine networks, including Internet Protocol (IP) addressing and subnets;

(B) describe the Open Systems Interconnection (OSI) model;

(C) describe the Transmission Control Protocol/Internet Protocol (TCP/IP) model;

(D) use network forensic analysis tools to examine network traffic data from sources such as firewalls, routers, intrusion detection systems (IDS), and remote access logs; and

(E) identify malicious or suspicious network activities such as mandatory access control (MAC) spoofing and rogue wireless access points.

(8) Digital forensics skills. The student explains the principles of access controls. The student is expected to:

(A) define the principle of least privilege;

(B) describe the impact of granting access and permissions;

(C) identify different access components such as passwords, tokens, key cards, and biometric verification systems;

(D) explain the value of an access log to identify suspicious activity;

(E) describe the risks of granting third parties access to personal and proprietary data on social media and systems;

(F) describe the risks involved with accepting Terms of Service (ToS) or End User License Agreements (EULA) without a basic understanding of the terms or agreements; and

(G) identify various access control methods such as mandatory access control (MAC), attribute-based access control (ABAC), role-based access control (RBAC), and discretionary access control (DAC).

(9) Incident response. The student follows a methodological approach to prepare for and respond to an incident. The student is expected to:

(A) define the components of the incident response cycle, including preparation; detection and analysis; containment, eradication, and recovery; and post-incident activity;

(B) describe incident response preparation;

(C) discuss incident response detection and analysis;

(D) discuss containment and eradication of and recovery from an incident;

(E) describe post-incident activities such as reflecting on lessons learned, using collected incident data, and retaining evidence of an incident;

(F) develop an incident response plan; and

(G) describe ways a user may compromise the validity of existing evidence.

(10) Incident response. The student objectively analyzes collected data from an incident. The student is expected to:

(A) identify the role of chain of custody in digital forensics;

(B) describe safe data handling procedures;

(C) explain the fundamental concepts of confidentiality, integrity, availability, authentication, and authorization;

(D) identify and report information conflicts or suspicious activity;

(E) identify events of interest and suspicious activity by examining network traffic; and

(F) identify events of interest and suspicious activity by examining event logs.

(11) Incident response. The student analyzes the various ways systems can be compromised. The student is expected to:

(A) analyze the different signatures of cyberattacks;

(B) identify points of weakness and attack vectors such as online spoofing, phishing, and social engineering; and

(C) differentiate between simple versus multistage attacks.

Source: The provisions of this §127.677 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.678. Cybersecurity Capstone (One Credit), Adopted 2022.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2023-2024 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisite: Foundations of Cybersecurity. Students shall be awarded one credit for successful completion of this course.

(c) 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 foundations.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) Cybersecurity is a critical discipline concerned with safeguarding computers, networks, programs, and data from unauthorized access. As a field, it has gained prominence with the expansion of a globally connected society. As computing has become more sophisticated, so too have the abilities of adversaries looking to penetrate networks and access sensitive information. Cybersecurity professionals prevent, detect, and respond to minimize disruptions to governments, organizations, and individuals.

(4) In the Cybersecurity Capstone course, students will develop the knowledge and skills needed to explore advanced concepts related to the ethics, laws, and operations of cybersecurity. Students will examine trends and operations of cyberattacks, threats, and vulnerabilities. Students will develop security policies to mitigate risks. The skills obtained in this course prepare students for additional study toward industry certification. A variety of courses are available to students interested in the cybersecurity field. Cybersecurity Capstone may serve as a culminating course in this field of study.

(5) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(6) 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.

(d) Knowledge and skills.

(1) Employability skills. The student identifies various employment opportunities in the cybersecurity field. The student is expected to:

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

(B) develop a resume or a portfolio appropriate to a chosen career plan; and

(C) demonstrate interview skills for successful job placement.

(2) Ethics and laws. The student evaluates ethical and current legal standards, rights, and restrictions governing technology, technology systems, digital media and information technology, and the use of social media in the context of today's society. The student is expected to:

(A) analyze and apply to a scenario local, state, national, and international cybersecurity laws such as David's Law and Digital Millennium Copyright Act;

(B) evaluate noteworthy incidents or events regarding cybersecurity; and

(C) evaluate compliance requirements such as Section 508 of the Rehabilitation Act of 1973, Family Educational Rights and Privacy Act of 1974 (FERPA), Health Insurance Portability and Accountability Act of 1996 (HIPAA), Gramm-Leach-Bliley Act (GLBA), and Cybersecurity Maturity Model Certification (CMMC).

(3) Digital citizenship. The student understands and demonstrates the social responsibility of end users regarding significant issues relating to digital technology, safety, digital hygiene, and cyberbullying. The student is expected to:

(A) debate the relationship between privacy and security; and

(B) differentiate between ethical and unethical behavior when presented with various scenarios related to cybersecurity activities.

(4) Cybersecurity skills. The student simulates the process of penetration testing. The student is expected to:

(A) illustrate the phases of penetration testing, including plan, discover, attack, and report;

(B) design a plan to gain authorization for penetration testing;

(C) evaluate commonly used vulnerability scanning tools such as port scanning, packet sniffing, and password crackers;

(D) develop a list of exploits based on results of scanning tool reports; and

(E) prioritize a list of mitigations based on results of scanning tool reports.

(5) Cybersecurity skills. The student understands common cryptographic methods. The student is expected to:

(A) evaluate symmetric and asymmetric algorithms such as substitution cipher, Advanced Encryption Standard (AES), Diffie-Hellman, and Rivest-Shamir-Adleman (RSA);

(B) interpret the purpose of hashing algorithms, including blockchain;

(C) demonstrate password salting;

(D) explain and create a digital signature; and

(E) illustrate steganography.

(6) Cybersecurity skills. The student understands the concept of system defense. The student is expected to:

(A) explain the purpose of establishing system baselines;

(B) evaluate the role of physical security;

(C) evaluate the functions of network security devices such as firewalls, intrusion detection systems (IDS), intrusion prevention systems (IPS), intrusion detection prevention systems (IDPS), and security information and event management (SIEM) systems;

(D) analyze log files for anomalies; and

(E) develop a plan demonstrating the concept of defense in depth.

(7) Cybersecurity skills. The student demonstrates an understanding of secure network design. The student is expected to:

(A) explain the benefits of network segmentation, including sandboxes, air gaps, and virtual local area networks (VLAN);

(B) investigate and discuss the role of software-managed networks, including virtualization and cloud architecture;

(C) evaluate the role of honeypots and honeynets in networks; and

(D) create an incoming and outgoing network policy for a firewall.

(8) Cybersecurity skills. The student integrates principles of digital forensics. The student is expected to:

(A) identify cyberattacks by their signatures, indicators, or patterns;

(B) explain proper data acquisition;

(C) examine evidence from devices for suspicious activities; and

(D) critique current cybercrime cases involving digital forensics.

(9) Cybersecurity skills. The student explores expanding and emerging technology. The student is expected to:

(A) describe the concept of Security as a Service and the role of managed security service providers (MSSP);

(B) describe the integration of artificial intelligence and machine learning in cybersecurity;

(C) investigate impacts made by predictive analytics on cybersecurity; and

(D) research and investigate other emerging trends such as augmented reality and quantum computing.

(10) Cybersecurity skills. The student uses various operating system environments. The student is expected to:

(A) select and execute appropriate commands via the command line interface (CLI) such as ls, cd, pwd, cp, mv, chmod, ps, sudo, and passwd;

(B) describe the file system structure for multiple operating systems;

(C) manipulate and edit files within the CLI; and

(D) determine network status using the CLI with commands such as ping, ifconfig/ipconfig, traceroute/tracert, and netstat.

(11) Cybersecurity skills. The student clearly and effectively communicates technical information. The student is expected to:

(A) collaborate with others to create a technical report;

(B) create, review, and edit a report summarizing technical findings; and

(C) present technical information to a non-technical audience.

(12) Risk assessment. The student understands risk and how risk assessment and risk management defend against attacks. The student is expected to:

(A) differentiate types of attacks, including operating systems, software, hardware, network, physical, social engineering, and cryptographic;

(B) explain blended threats such as combinations of software, hardware, network, physical, social engineering, and cryptographic;

(C) discuss types of risk, including business, operational, security, and financial;

(D) discuss risk response techniques, including accept, transfer, avoid, and mitigate;

(E) develop a plan of preventative measures based on discovered vulnerabilities and the likelihood of a cyberattack;

(F) identify and discuss common vulnerability disclosure websites;

(G) describe common web vulnerabilities such as cross-site scripting, buffer overflow, injection, spoofing, and denial of service;

(H) describe common data destruction and media sanitation practices such as wiping, shredding, and degaussing; and

(I) develop an incident response plan for a given scenario or attack.

(13) Risk assessment. The student understands risk management processes and concepts. The student is expected to:

(A) describe Zero Trust, least privilege, and various access control methods such as mandatory access control (MAC), role-based access control (RBAC), and discretionary access control (DAC);

(B) develop and defend a plan for multi-factor access control using components such as biometric verification systems, key cards, tokens, and passwords; and

(C) review and appraise a disaster recovery plan (DRP) that includes backups, redundancies, system dependencies, and alternate sites.

(14) Risk assessment. The student investigates the role and effectiveness of environmental controls. The student is expected to:

(A) explain commonly used physical security controls, including lock types, fences, barricades, security doors, and mantraps; and

(B) describe the role of embedded systems such as fire suppression; heating, ventilation, and air conditioning (HVAC) systems; security alarms; and video monitoring.

Source: The provisions of this §127.678 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.679. Computer Maintenance (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Information Technology. Recommended corequisite: Computer Maintenance Lab. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) In Computer Maintenance, students will acquire knowledge of computer maintenance and creating appropriate documentation. Students will analyze the social responsibility of business and industry regarding the significant issues relating to the environment, ethics, health, safety, and diversity in society and in the workplace as related to computer maintenance. Students will apply technical skills to address the IT industry and emerging technologies.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student identifies various employment opportunities in the IT field. The student is expected to:

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

(B) examine the role of certifications, resumes, and portfolios in the IT profession.

(2) The student applies 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; and

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

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

(A) explain the fundamentals of microprocessor theory;

(B) define the use of Boolean and Binary 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 and analog 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;

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

(J) identify new and emerging technologies that may affect the field of computer technology.

(4) The student uses hardware design, operation, and maintenance knowledge and skills to identify major computer components. 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 how mobile devices such as personal data assistants and cell phones operate;

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

(D) demonstrate an understanding of the rationale behind error messages and symptoms of hardware failures;

(E) research interrupt sequences and beep codes; and

(F) identify priorities and interrupts at the system level.

(5) The student acquires knowledge of operating system design, including operation and maintenance. The student is expected to:

(A) explain the fundamentals of an operating system;

(B) compare and contrast different operating systems; and

(C) identify the operating systems of mobile devices.

(6) The student acquires knowledge of the theory behind the installation, configuration of software programs, and updates in IT systems. The student is expected to:

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

(B) evaluate application software packages;

(C) verify that software is properly licensed prior to installation;

(D) differentiate between types of software such as Software as a Service, single-user, per-seat, enterprise, freeware, shareware, and open-source licensing; and

(E) explain proper troubleshooting techniques related to computer software.

(7) The student acquires knowledge of the installation and configuration of network connections. The student is expected to:

(A) explain the fundamentals of network connections and interface requirements;

(B) explain the steps required to install and configure a computer on a network; and

(C) identify the steps to troubleshoot network connectivity.

Source: The provisions of this §127.679 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.680. Computer Maintenance Lab (One Credit), Adopted 2015.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Information Technology. Corequisite: Computer Maintenance. This course must be taken concurrently with Computer Maintenance and may not be taken as a stand-alone course. Districts are encouraged to offer this course in a consecutive block with Computer Maintenance to allow students sufficient time to master the content of both courses. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) In Computer Maintenance Lab, students will acquire knowledge of computer maintenance and creating appropriate documentation. Students will analyze the social responsibility of business and industry regarding the significant issues relating to the environment, ethics, health, safety, and diversity in society and in the workplace as related to computer maintenance. Students will apply technical skills to address the IT industry and emerging technologies.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) demonstrate 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) demonstrate positive personal qualities such as flexibility, open mindedness, initiative, listening attentively to speakers, and willingness to learn new 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 IT; and

(I) demonstrate planning and time-management skills such as project management, including initiating, planning, executing, monitoring and controlling, and closing a project.

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

(A) complete work orders for repair and installation;

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

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

(3) The student demonstrates 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) research new and emerging technologies that may affect the field of computer technology.

(4) 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 and bus design;

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

(D) demonstrate proper usage of 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.

(5) The student uses hardware design, operation, and maintenance knowledge and skills to identify major computer components. The student is expected to:

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

(B) install and configure computer components such as printers and other peripherals.

(6) The student uses troubleshooting skills to solve client problems. The student is expected to:

(A) diagnose error messages and symptoms of hardware failures;

(B) research and identify interrupt sequences and beep codes;

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

(D) test a system using diagnostic tools and software;

(E) diagnose problems in operating systems;

(F) differentiate between hardware and software failure;

(G) update Basic Input/Output System (BIOS);

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

(I) gather information from the user;

(J) repair malfunctioning hardware systems;

(K) reinstall software as needed;

(L) demonstrate system backup and recovery;

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

(N) demonstrate knowledge of operating system design such as operation and maintenance; and

(O) apply knowledge of operating system design to perform information support and service tasks of different operating systems.

(7) The student installs and configures software programs and updates IT 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 such as recovery from system error;

(E) perform software customization as requested;

(F) document all procedures; and

(G) install and maintain security software.

(8) 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.

(9) 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.

Source: The provisions of this §127.680 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.681. Networking (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisites: Principles of Information Technology, Computer Maintenance, and Computer Maintenance Lab. Recommended corequisite: Networking Lab. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) In Networking, students will develop knowledge of the concepts and skills related to data networking technologies and practices in order to apply them to personal or career development. To prepare for success, students will have opportunities to reinforce, apply, and transfer knowledge and skills to a variety of settings and problems.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student identifies various employment opportunities in the IT 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 resume.

(2) 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.

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

(A) explain digital and analog electronics theory;

(B) demonstrate knowledge of binary in relation to Internet Protocol (IP) addressing;

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

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

(E) explain Transport Control Protocol and IP fundamentals, including subnetting;

(F) distinguish between public and private networks;

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

(H) differentiate between types of networks;

(I) identify national standards for data communication; and

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

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

(A) demonstrate understanding of 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) differentiate among computer network topologies;

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

(G) explain the use of Transport Control Protocol and IP utilities;

(H) explain how to test, validate, and troubleshoot IP connectivity; and

(I) identify good practices to ensure network security.

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

(A) analyze various types and components of networks; and

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

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

(A) produce planning documentation required prior to network implementation;

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

(C) identify common peripheral ports and common network components such as hubs, routers, and switches;

(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 standard backup procedures and backup media storage practices; and

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

(7) 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.

Source: The provisions of this §127.681 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.682. Networking Lab (One Credit), Adopted 2015.

(a) Implementation. The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisites: Principles of Information Technology, Computer Maintenance, and Computer Maintenance Lab. Corequisite: Networking. This course must be taken concurrently with Networking and may not be taken as a stand-alone course. Districts are encouraged to offer this course in a consecutive block with Networking to allow students sufficient time to master the content of both courses. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) In Networking Lab, students will develop knowledge of the concepts and skills related to telecommunications and data networking technologies and practices in order to apply them to personal or career development. To prepare for success, students must have opportunities to reinforce, apply, and transfer knowledge and skills to a variety of settings and problems.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:

(A) identify and demonstrate 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 IT; and

(I) demonstrate planning and time-management skills such as project management, including initiating, planning, executing, monitoring and controlling, and closing a project.

(2) The student identifies various employment opportunities in the IT 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 resume.

(3) The student applies related 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.

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

(A) analyze various types and components of networks;

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

(C) recommend data network solutions based on scenario-driven problems.

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

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

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

(C) indicate 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) research new and emerging technologies that may affect the field of telecommunications and data networking services.

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

(A) demonstrate awareness of compatibility and cabling issues;

(B) implement an addressing scheme, including a subnet;

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

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

(E) troubleshoot physical and logical indicators of trouble;

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

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

(H) maintain a hierarchical structure for the storing and organizing of data on networks.

(7) 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 data communications;

(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.

(8) 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.

(9) 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.

Source: The provisions of this §127.682 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.683. Digital Media (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 9-12. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) In Digital Media, students will analyze and assess current and emerging technologies, while designing and creating multimedia projects that address customer needs and resolve a problem. Students will implement personal and interpersonal skills to prepare for a rapidly evolving workplace environment. The knowledge and skills acquired and practiced will enable students to successfully perform and interact in a technology-driven society. Students will enhance reading, writing, computing, communication, and critical thinking and apply them to the IT environment.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student identifies employment opportunities in the IT field with a focus in the area of digital 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 resumes and portfolios; and

(D) create a digital portfolio.

(2) 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, social media, podcasting, and wikis;

(B) demonstrate appropriate search strategies for finding resources or assets on the Internet;

(C) discuss recent digital media technologies; and

(D) evaluate and select appropriate software for the development of projects.

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

(A) explain and demonstrate ethical use of technology and online resources;

(B) compare and contrast fair use, open source, and creative commons;

(C) adhere to intellectual property laws and regulations;

(D) differentiate between copyright and trademarks;

(E) explain the concept of intellectual property laws, including copyright, trademarks, and patents and consequences of violating each type of law;

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

(G) demonstrate ethical use of Internet and online resources, including citation of source; and

(H) describe the function of a non-disclosure agreement and intellectual property agreement.

(4) The student analyzes and applies design and layout principles in digital media. 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 apply perspective such as backgrounds, light, shades, shadows, and scale to capture a focal point and create depth;

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

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

(E) identify and apply concepts of typography;

(F) identify and apply color theory; and

(G) create and improve digital products by applying the appropriate design and layout principles.

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

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

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

(C) export and set graphics to be used in both print and digital formats;

(D) demonstrate knowledge of graphic resolution, file size, file formats, and file management;

(E) determine the type of data stored in a file based on its file extension and select appropriate software to modify, create, and view the file; and

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

(6) 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 photo editing software.

(7) 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 ethics in the use of digital video photography equipment to capture video images;

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

(E) apply videographic enhancement and editing techniques such as panning, transitioning, 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 podcasts, downloadable media, social media, and streaming video.

(8) 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;

(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 podcasts, downloadable files, social media, and streaming video.

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

(A) plan and create a linear and non-linear animation using accepted standards such as design principles, frames and key frames, integration of audio into an animation, and user interactive controls;

(B) deploy animation to be used in various digital formats and on various video animation players; and

(C) create an interactive animation.

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

(A) initiate a project, including identifying the purpose, audience, and audience needs for design plans;

(B) develop a plan for a media project such as a storyboard and stage development and identify equipment and resources;

(C) execute and monitor and control a project along its timeline and make suggested revisions until completion of the project; and

(D) close a project, including identifying lessons learned.

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

(A) incorporate video, audio, text, graphics, and animations into a web page;

(B) incorporate various digital media products into an electronic document such as a newsletter, social media outlet, poster, or report; and

(C) incorporate various digital media products into an interactive product such as an animation, computer program, simulation, interactive website, or application.

Source: The provisions of this §127.683 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.684. Web Communications (One-Half Credit).

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. Students shall be awarded one-half credit for successful completion of this course. This course is recommended for students in Grade 9.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) In Web Communications, students will acquire knowledge of web communications and technological operations and concepts. This is an exploratory course in web communications. The six strands include creativity and innovation; communication and collaboration; research and information fluency; critical thinking; problem solving, and decision making; digital citizenship; and technology operations and concepts.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) Creativity and innovation. The student demonstrates creative thinking, constructs knowledge, and develops innovative products and processes using technology. The student is expected to:

(A) demonstrate proficiency in the use of local and online collaboration;

(B) create websites using web editors or web authoring programs;

(C) evaluate the accessibility and usability of original websites; and

(D) conceptualize possible technologies based on current technical trends.

(2) Communication and collaboration. The student uses digital technology to work collaboratively toward his or her own learning and the learning of others. The student is expected to:

(A) analyze and implement the proper and acceptable use of digital/virtual communications technologies such as instant messaging (IM), chat, email, and social networking;

(B) define and implement the acquisition, sharing, and use of files taking into consideration primary ownership and copyright;

(C) apply decisions regarding the selection, acquisition, and sharing of uniform resource locators (URLs) used in research, taking into consideration their quality, appropriateness, and effectiveness; and

(D) solve problems using critical-thinking strategies.

(3) Research and information fluency. The student applies digital tools to gather, evaluate, and use information. The student is expected to:

(A) verify the accuracy, validity, and currency of acquired information;

(B) conduct effective searches using Boolean operators;

(C) acquire and use appropriate vocabulary terms;

(D) cite sources appropriately using established methods;

(E) model ethical and legal acquisition of digital information following guidelines in the student code of conduct, including plagiarism and copyright laws;

(F) identify and discuss emerging technologies and their impact;

(G) understand Internet history and structure and how they impact current use; and

(H) demonstrate appropriate use of grammar, spelling, and vocabulary when creating original work.

(4) Critical thinking, problem solving, and decision making. The student uses critical-thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. The student is expected to:

(A) demonstrate the transfer and adaptation of knowledge through the creation of original work;

(B) evaluate and implement security measures such as firewalls and Hypertext Transfer Protocol Secure (HTTPS) to protect original work;

(C) analyze and follow timelines needed to create, edit, and present original work;

(D) verify current licensing issues for software being used for the creation of original work;

(E) identify and evaluate the design and functionality of web pages using rubrics;

(F) optimize web information for fast download such as dial-up and high-speed Internet and mobile devices; and

(G) evaluate original work through self-, peer, and professional review of websites.

(5) Digital citizenship. The student understands human, cultural, and societal issues related to technology and practices legal and ethical behavior. The student is expected to:

(A) engage in online activities that follow appropriate behavioral, communication, and privacy guidelines, including ethics, personal security, and verbiage determined by the intended audience;

(B) understand the negative impact of inappropriate technology use, including online bullying and harassment;

(C) implement online security guidelines, including identity protection, limited personal information sharing, and password protection of a secure website; and

(D) advocate and practice safe, legal, and responsible use of information and technology.

(6) Technology operations and concepts. The student demonstrates a sound understanding of technology concepts, systems, and operations. The student is expected to:

(A) demonstrate knowledge of hardware such as scanners, cameras, printers, video cameras, and external hard drives;

(B) identify the parts of a computer and explain their functions;

(C) summarize the need, functionality, and use of servers;

(D) identify the advantages and disadvantages of running a personal web server versus using a web server provider;

(E) differentiate and appropriately use various input, processing, output, and primary/secondary storage devices;

(F) create and implement universally accessible documents;

(G) analyze bandwidth issues as they relate to audience, servers, connectivity, and cost;

(H) establish a folder/directory hierarchy for storage of a web page and its related or linked files;

(I) follow file and folder naming conventions, including spacing, special characters, and capitalization; and

(J) identify basic design principles when creating a website.

Source: The provisions of this §127.684 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.685. Web Design (One Credit).

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. Students shall be awarded one credit for successful completion of this course. This course is recommended for students in Grades 9-12.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) In Web Design students will acquire knowledge of web design and technological operations and concepts that support creativity, innovation, collaboration, information fluency, critical thinking and decision making. The six strands include creativity and innovation; communication and collaboration; research and information fluency; critical thinking; problem solving, and decision making; digital citizenship; and technology operations and concepts.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) Creativity and innovation. The student demonstrates creative thinking, constructs knowledge, and develops innovative products and processes using technology. The student is expected to:

(A) demonstrate proficiency in local and online collaboration;

(B) create a website using web editors and web authoring programs;

(C) evaluate the accessibility and usability of an original website as it relates to a target audience;

(D) conceptualize new possible technologies based on current technical trends;

(E) analyze the use of virtualization such as virtual classrooms, distance learning, virtual storage, and a virtual operating system;

(F) demonstrate knowledge and appropriate use of operating systems, software applications, and communication and networking components; and

(G) make decisions regarding the selection, acquisition, and use of software, taking into consideration its quality, appropriateness, effectiveness, and efficiency.

(2) Communication and collaboration. The student uses digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning experience of others. The student is expected to:

(A) analyze and implement the proper and acceptable use of digital/virtual communications technologies such as instant messaging (IM), chat, email, and social networking;

(B) define and implement the acquisition, sharing, and use of files, taking into consideration their primary ownership and copyright;

(C) apply decisions regarding the selection, acquisition, and sharing of uniform resource locators (URLs) used in research, taking into consideration their quality, appropriateness, and effectiveness;

(D) solve problems using critical-thinking strategies; and

(E) compare, evaluate, and implement the use of wired versus wireless access.

(3) Research and information fluency. The student applies digital tools to gather, evaluate, and use information. The student is expected to:

(A) verify the accuracy, validity, and currency of acquired information;

(B) conduct effective searches with Boolean operators;

(C) acquire and use appropriate vocabulary terms;

(D) cite sources appropriately using established methods;

(E) model ethical and legal acquisition of digital information following guidelines in the student code of conduct, including plagiarism and copyright laws;

(F) identify and discuss emerging technologies and their impact;

(G) understand Internet history and structure and how they impact current use;

(H) demonstrate appropriate use of grammar, spelling, and vocabulary when creating original work;

(I) acquire, evaluate, and use various web standards such as World Wide Web Consortium (W3C), Ecma International, and Internet Corporation for Assigned Names and Numbers (ICANN) to make informed decisions and implement standards in original work;

(J) understand, analyze, and use interactive websites;

(K) understand, evaluate, and determine the appropriate use of dynamic and static websites;

(L) understand, evaluate, and determine the appropriate use of open/closed source file formats and software;

(M) explain and demonstrate how search engines work such as advanced options, preferences, advertising, and search categories;

(N) evaluate, create, and apply principles of project management, including web storyboards, site maps, job duties, time constraints, group dynamics, communication interaction, and project completion, evaluation, and feedback;

(O) understand the use and application of a virtual private network (VPN);

(P) distinguish among protocols, including Hypertext Transfer Protocol (HTTP) and File Transfer Protocol (FTP);

(Q) summarize the technical needs of a World Wide Web server, including random access memory (RAM), hard disk capacity, central processing unit (CPU) speed, busses, methods of connectivity, and appropriate software;

(R) demonstrate proficiency in the use of a variety of electronic input devices such as keyboard, scanner, voice/sound recorder, mouse, touch screen, or digital video by incorporating such components while publishing web pages;

(S) demonstrate proper digital etiquette and knowledge of acceptable use policies when using networks, especially resources on the Internet and intranets;

(T) demonstrate proficiency in and appropriate use and navigation of local area networks (LANs), wide area networks (WANs), the Internet, and intranets for research and resource sharing;

(U) construct appropriate search strategies in the acquisition of information from the Internet, including keyword searches and searches with Boolean operators; and

(V) acquire information in electronic formats, including text, audio, video, and graphics, citing the source.

(4) Critical thinking, problem solving, and decision making. The student uses critical-thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. The student is expected to:

(A) demonstrate the transfer and adaptation of knowledge through the creation of original work;

(B) evaluate and implement security measures to protect original work such as firewalls and Hypertext Transfer Protocol Secure (HTTPS);

(C) analyze and follow timelines needed to create, edit, and present original work;

(D) verify current licensing issues for software being used for the creation of original work;

(E) identify and evaluate the design and functionality of web pages using rubrics;

(F) optimize web information for fast download such as dial-up and high-speed Internet and mobile devices;

(G) evaluate original work through self-, peer, and professional review of websites;

(H) evaluate the types, functions, and target audiences of websites;

(I) read, use, and develop technical documents;

(J) analyze, examine, assess, and decide on servers as they relate to the management of a website;

(K) analyze, examine, assess, and decide on a web host;

(L) analyze, examine, assess, and decide on domain name acquisition and retention;

(M) evaluate the functionality of a website such as color scheme, grammar, technological constraints, age appropriateness, cross-platform usability, and user relevant criteria as it relates to an intended audience;

(N) identify software file formats and their characteristics and appropriate use;

(O) identify and apply search engine optimization (SEO) to ensure optimal website visibility;

(P) investigate and choose electronic security methods for a web server to protect from unauthorized access and negative intentions; and

(Q) draw conclusions from data gathered from electronic and telecommunication resources.

(5) Digital citizenship. The student understands human, cultural, and societal issues related to technology and practices legal and ethical behavior. The student is expected to:

(A) engage in online activities that follow appropriate behavioral, communication, and privacy guidelines, including ethics, personal security, verbiage determined by the intended audience, and ethical use of files and file sharing;

(B) understand the negative impact of inappropriate technology use, including online bullying and harassment;

(C) implement online security guidelines, including identity protection, limited personal information sharing, and password protection of a secure website;

(D) engage in safe, legal, and responsible use of information and technology;

(E) understand and respond to local, state, national, and global issues to ensure appropriate cross-browser and cross-platform usability;

(F) interpret, use, and develop a safe online shared computing environment;

(G) identify legal, ethical, appropriate, and safe website marketing practices;

(H) identify legal, ethical, appropriate, and safe multimedia usage, including video, audio, graphics, animation, and emerging trends;

(I) analyze the impact of the World Wide Web on society through research, interviews, and personal observation; and

(J) participate in relevant and meaningful activities in the larger community and society to create electronic projects.

(6) Technology operations and concepts. The student demonstrates a sound understanding of technology concepts, systems, and operations. The student is expected to:

(A) demonstrate knowledge of hardware, including scanners, cameras, printers, video cameras, and external hard drives;

(B) identify the parts of a computer and explain its functions;

(C) summarize the need for and functionality and use of servers;

(D) identify the advantages and disadvantages of running a personal web server versus using a web server provider;

(E) differentiate and appropriately use various input, processing, output, and primary/secondary storage devices;

(F) create and implement universally accessible documents;

(G) analyze bandwidth issues as related to audience, server, connectivity, and cost;

(H) establish a folder/directory hierarchy for storage of a web page and its related or linked files;

(I) create file and folder naming conventions to follow established guidelines, including spacing, special characters, and capitalization;

(J) identify basic design principles when creating a website, including white space, color theory, background color, shape, line, proximity, unity, balance (ratio of text to white

space), alignment, typography, font size, type, style, image file size, repetition, contrast, consistency, and aesthetics;

(K) demonstrate knowledge of the six core domains (gov, net, com, mil, org, edu) and be familiar with new domain implementation;

(L) implement escape codes, HyperText Markup Language (HTML), cascading style sheets (CSS), and JavaScript through hard coding, web editors, and web authoring programs;

(M) identify and use FTP client software;

(N) implement java applet insertion;

(O) identify and differentiate various network topologies, including physical and logical;

(P) create, evaluate, and use web-based animation;

(Q) create, evaluate, and use video, including editing, compression, exporting, appropriateness, and delivery;

(R) demonstrate the ability to conduct secure communications from a web server to a client; and

(S) use hypertext linking appropriately when creating web pages.

Source: The provisions of this §127.685 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.686. Discrete Mathematics for Computer Science (One Credit), Beginning with School Year 2012-2013.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2012-2013 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. Students shall be awarded one credit for successful completion of this course. Prerequisite: Algebra II. This course is recommended for students in Grades 11 and 12.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) Discrete Mathematics for Computer Science provides the tools used in most areas of computer science. Exposure to the mathematical concepts and discrete structures presented in this course is essential in order to provide an adequate foundation for further study. Discrete Mathematics for Computer Science is generally listed as a core requirement for Computer Science majors. Course topics are divided into six areas: sets, functions, and relations; basic logic; proof techniques; counting basics; graphs and trees; and discrete probability. Mathematical topics are interwoven with computer science applications to enhance the students' understanding of the introduced mathematics. Students will develop the ability to see computational problems from a mathematical perspective. Introduced to a formal system (propositional and predicate logic) upon which mathematical reasoning is based, students will acquire the necessary knowledge to read and construct mathematical arguments (proofs), understand mathematical statements (theorems), and use mathematical problem-solving tools and strategies. Students will be introduced to discrete data structures such as sets, discrete functions, and relations and graphs and trees. Students will also be

introduced to discrete probability and expectations. The six strands include creativity and innovation; communication and collaboration; research and information fluency; critical thinking; problem solving, and decision making; digital citizenship; and technology operations and concepts.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) Creativity and innovation. The student develops products and generates new understanding by extending existing knowledge. The student is expected to:

(A) model algorithms and real-world situations using formal tools of symbolic logic;

(B) model computer science problems by using graphs and trees; and

(C) calculate the probabilities of events and expectations of random variables for such problems as games of chance.

(2) 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) convert spoken language statements to appropriate statements in propositional logic;

(B) explain basic terminology of sets, functions, and relations;

(C) state the definition of the Master theorem;

(D) use the context of a particular application to interpret the meaning derived when computing the permutations and combinations of a set;

(E) interpret associated operations and terminology in context; and

(F) define and provide examples of logical equivalence, normal forms, validity, and modus ponens/modus tollens.

(3) Research and information fluency. The student locates, analyzes, processes, and organizes data. The student is expected to:

(A) construct truth tables for negation, conjunction, disjunction, implication, biconditional, and bit operators; and

(B) use truth tables to demonstrate propositional relations.

(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) analyze practical examples using appropriate models of sets, functions, and relations;

(B) compare and contrast tautology, contradiction, and contingency as related to propositional equivalences;

(C) compare and contrast examples and use of counterexamples, contrapositions, and contradictions;

(D) describe the appropriate use and limitations of predicate logic;

(E) apply formal methods of symbolic propositional and predicate logic;

(F) use formal logic proofs and logical reasoning to solve problems;

(G) outline the basic structure of proofs, including direct, indirect, contradiction, induction, existence, and constructive proofs;

(H) compare and contrast the types of problems best satisfied by direct, indirect, contradiction, induction, existence, and constructive proofs;

(I) relate mathematical induction to recursion and recursively defined structures;

(J) compare and contrast weak, strong, and structural induction, including when each is most appropriately used and examples of each;

(K) compare and contrast dependent and independent events;

(L) use recurrence equations to analyze algorithms and other practical problems;

(M) use counting techniques to analyze algorithms and other practical problems;

(N) apply probability tools to solve problems; and

(O) define, compare, and contrast simple graphs, multigraphs, and directed and undirected graphs using definitions, properties, and examples, including special cases.

(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) model ethical acquisition and use of digital information;

(B) demonstrate proper digital etiquette, responsible use of software, and knowledge of acceptable use policies; and

(C) investigate how the concepts of discrete mathematics are related to relevant problems and significant questions.

(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) perform operations associated with sets, functions, and relations;

(B) apply basic counting principles, including cardinality and the pigeonhole principle;

(C) apply appropriate precedence when using logical operators;

(D) use appropriate strategies, including De Morgan's Laws, to identify propositional equivalences;

(E) identify and appropriately use predicates, existential and universal quantifiers, and valid arguments;

(F) identify possible applications of proofs, including evaluating algorithmic complexity;

(G) state and appropriately use the product and sum rules;

(H) compute permutations and combinations of a set;

(I) solve a variety of basic recurrence equations;

(J) apply the binomial theorem to independent events;

(K) apply Bayes' theorem to dependent events;

(L) demonstrate transversal methods for trees and graphs; and

(M) relate graphs and trees to data structures, algorithms, and counting.

Source: The provisions of this §127.686 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.687. Game Programming and Design (One Credit).

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. Students shall be awarded one credit for successful completion of this course. Prerequisite: Algebra I. This course is recommended for students in Grades 9-12.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) Game Programming and Design will foster student creativity and innovation by presenting students with opportunities to design, implement, and present meaningful programs through a variety of media. Students will collaborate with one another, their instructor, and various electronic communities to solve gaming problems. Through data analysis, students will include the identification of task requirements, plan search strategies, and use programming concepts to access, analyze, and evaluate information needed to design games. By acquiring programming 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 and regulations and by practicing integrity and respect. Students will create a computer game that is presented to an evaluation panel. The six strands include creativity and innovation; communication and collaboration; research and information fluency; critical thinking; problem solving, and decision making; digital citizenship; and technology operations and concepts.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) Creativity and innovation. The student develops products and generates new understanding by extending existing knowledge. The student is expected to:

(A) understand the basic game design elements, including conceptual ideas, storyline, visualization, storyboard, game effects, sound elements, game play, game controls, and player tutorial;

(B) create a design concept document;

(C) create a storyboard;

(D) demonstrate an understanding of the fundamentals of game art, including the look and feel, graphics coordinate system, basics of color, and color palettes;

(E) use bitmap graphics images, including designing, creating, reading, and manipulating images;

(F) create backgrounds, including solid, image, and tiled backgrounds;

(G) write programs creating images using geometric shapes;

(H) create games using sprites by evaluating the role of sprites, creating sprites, and managing sprites;

(I) create programs using sprite sheets;

(J) demonstrate an understanding of image rendering, including transparency, refresh rate, hardware acceleration, and animation;

(K) find, create, and edit game audio sound effects and music; and

(L) implement game sound mechanics, including playing, pausing, and looping.

(2) 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) design and implement procedures to set timelines for, track the progress of, and evaluate a game product;

(B) seek and respond to input from peers and professionals in evaluating a game project;

(C) demonstrate knowledge and appropriate use of operating systems, program development tools, and networking resources;

(D) use network resources to acquire, organize, maintain, and evaluate information;

(E) collaborate to research the business of games, including the roles of developer, marketing, publisher, and retail sales; and

(F) demonstrate an understanding of and evaluate online technology, including online interaction and massive multiplayer games.

(3) Research and information fluency. The student locates, analyzes, processes, and organizes data. The student is expected to:

(A) play board games to research and collect game play data;

(B) evaluate, analyze, and document game styles and playability; and

(C) research the dramatic elements in games, including kinds of fun, player types, and nonlinear storytelling.

(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 an understanding of the game design process, including generating ideas, brainstorming, and paper prototyping;

(B) write programs using variables of different data types;

(C) evaluate game rules and instructions;

(D) demonstrate an understanding of the user experience by comparing rules and game-play patterns;

(E) write game rules and instructions;

(F) develop game software;

(G) write computer game code, resolve game defects, and revise existing game code; and

(H) test a finished game product by implementing sound testing techniques.

(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) explore intellectual property, privacy, sharing of information, copyright laws, and software licensing agreements;

(B) model ethical acquisition and use of digital information;

(C) demonstrate proper digital etiquette when using networks, responsible use of software, and knowledge of acceptable use policies;

(D) model respect of intellectual property, including manipulating graphics, morphing graphics, editing graphics, and editing sound;

(E) discuss and evaluate the social issues surrounding gaming; and

(F) evaluate the cultural aspects of game design fundamentals, including rationale for games and types of games.

(6) Technology operations and concepts. The student understands technology concepts, systems, and operations as they apply to game programming. The student is expected to:

(A) identify basic game components, including the game engine, game play subsystems, data structures, models, and interfaces;

(B) generate random numbers in a program;

(C) create a program implementing conditional statements;

(D) develop an appropriate data model;

(E) demonstrate an understanding of and apply object-oriented game programming;

(F) demonstrate an understanding of game programming essentials, including event-driven programming, communicating with messages, and device management;

(G) demonstrate an understanding of the role of game events, the animation loop, and game timing;

(H) demonstrate an understanding of the role of game engines;

(I) demonstrate an understanding of video display flicker and double buffering;

(J) apply basic game screen design and layout, including visual controls, user interfaces, menus, and options;

(K) use game control design to understand, access, and control input devices, including keyboard, mouse, and joystick;

(L) demonstrate an understanding of and apply game animation, including the principles of animation and frame-based animation;

(M) demonstrate an understanding of decision making and types of decisions;

(N) demonstrate an understanding of game events, including listeners, triggers, and timed events;

(O) demonstrate an understanding of and implement collision detection, including bounding boxes and sprite collisions;

(P) implement a tile-based game, including loading tile maps, drawing tile maps, rendering a tile map, and layering sprites;

(Q) demonstrate an understanding of artificial intelligence and develop and implement artificial intelligence;

(R) demonstrate an understanding of game balance and tuning; and

(S) demonstrate an understanding of player progression, including leveling, linear progression, and maintaining high score data.

Source: The provisions of this §127.687 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.688. Mobile Application Development (One Credit).

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. Students shall be awarded one credit for successful completion of this course. Prerequisite: Algebra I. This course is recommended for students in Grades 9-12.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) Mobile Application Development will foster students' creativity and innovation by presenting opportunities to design, implement, and deliver meaningful projects using mobile computing devices. Students will collaborate with one another, their instructor, and various electronic communities to solve problems presented throughout the course. Through data analysis, students will identify task requirements, plan search strategies, and use software development concepts to access, analyze, and evaluate information needed to program mobile devices. By using software design 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 and regulations and by practicing integrity and respect. Students will gain an understanding of the principles of mobile application development through the study of development platforms, programming languages, and software design standards. The six strands include creativity and innovation; communication and collaboration; research and information fluency; critical thinking; problem solving, and decision making; digital citizenship; and technology operations and concepts.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) Creativity and innovation. The student develops products and generates new understanding by extending existing knowledge. The student is expected to:

(A) create effective user interfaces appropriate for a specified mobile device that is best suited for an identified purpose;

(B) create effective user interfaces for browser-based, native, and hybrid mobile applications;

(C) create mobile application components appropriate for identified needs;

(D) create browser-based applications for mobile devices;

(E) create native applications that can reside on specified mobile devices; and

(F) create mobile applications that combine native and hybrid components.

(2) 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) demonstrate an understanding of and discuss how teams function;

(B) use teamwork to solve problems;

(C) describe the development workflow of mobile applications;

(D) use time-management techniques to develop and maintain work schedules, meet deadlines, and establish mobile application project criteria;

(E) describe a problem solution; and

(F) document and share problem solutions through various media.

(3) Research and information fluency. The student locates, analyzes, processes, and organizes data. The student is expected to:

(A) analyze, identify, and describe mobile application project stakeholders and their perspectives;

(B) collect and analyze available data to identify mobile application project requirements;

(C) analyze, identify, and describe input, output, and processing requirements; and

(D) analyze, identify, and define hardware and software specifications.

(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) compare and contrast design decisions based on the hardware considerations of a mobile device;

(B) compare and contrast available mobile technologies, including platforms and their operating systems;

(C) compare and contrast available development approaches, including application to specific technologies and platforms;

(D) determine the most appropriate solution for the development of a given mobile application, including browser-based, native, and hybrid approaches;

(E) compare and contrast available programming languages and how their use might be applied to specific technologies and platforms;

(F) identify and justify the selection of an appropriate programming language, including available resources and required interfaces;

(G) select an appropriate program development environment;

(H) identify and use available libraries;

(I) evaluate and justify the selection of appropriate options and components;

(J) compare and contrast available networks and their implications for mobile application development; and

(K) compare and contrast design strategies related to mobile network and device security.

(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 copyright laws and issues;

(B) model ethical acquisition and use of digital information;

(C) cite sources using established methods;

(D) demonstrate proper digital etiquette and knowledge of acceptable use policies;

(E) investigate mobile device security measures such as passwords, virus detection, and virus prevention;

(F) describe potential risks and benefits associated with the use of a mobile application;

(G) identify current and emerging technologies related to mobile applications; and

(H) evaluate technologies and assess their applicability to current mobile applications.

(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) demonstrate an understanding of the difference between desktop and mobile applications;

(B) demonstrate an understanding of hardware and software structures and requirements in the design of mobile applications;

(C) recognize multiple platforms and demonstrate an understanding of their associated requirements;

(D) recognize various program development environments;

(E) demonstrate an understanding of event-based programming and its appropriate use;

(F) describe how memory management affects mobile application design;

(G) demonstrate an understanding of how low bandwidth and the mobility of a device affect the design of mobile applications;

(H) identify applications that are best suited for mobile devices;

(I) demonstrate an understanding of the use of libraries when designing mobile applications;

(J) use a simulation tool to emulate a mobile device's functionality; and

(K) use actual mobile devices to test mobile applications.

Source: The provisions of this §127.688 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.689. Advanced Cloud Computing (One Credit), Adopted 2025.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills, Adopted 2025) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Prerequisite: At least one credit from a course in computer science, programming, software development, or networking systems. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services. This career cluster includes occupations ranging from software developer and programmer to cybersecurity specialist and network analyst.

(3) The Advanced Cloud Computing course is an exploration of cloud computing. In this course, students explore cloud computing services, applications, and use cases. Students study cloud computing best practices and learn how cloud computing helps users develop a global infrastructure to support use case at scale while also developing and using innovative technologies.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student understands the impact of cloud computing technology and compares the major services offered by cloud computing providers. The student is expected to:

(A) describe the benefits and risks of cloud computing and the reasons for switching from on-premises computing to cloud computing;

(B) identify and describe the major types of cloud computing;

(C) generate sample cloud usage plans for a business case study, including a description of how each of the services can be used to improve the business;

(D) explain the purpose of a region, availability zone, and edge location; and

(E) compare the major services offered by cloud computing providers.

(2) The student demonstrates how to store and share content in the cloud. The student is expected to:

(A) identify features and functions of commonly used cloud services;

(B) locate and use common services found in cloud computing consoles;

(C) analyze how cloud services are used in real-world industries;

(D) explain the functions of a domain name system (DNS);

(E) create an object storage bucket;

(F) explain benefits and uses of a content delivery network;

(G) configure web content distribution via edge locations and attach it to a website;

(H) identify the benefits, features, and use cases of different types of block storage;

(I) analyze a use case and recommend the best type of virtual storage for the particular situation;

(J) create a block storage volume or physical record;

(K) attach a block storage volume to a virtual computing instance; and

(L) create a virtual computing instance that hosts a simple website.

(3) The student applies cloud security best practices in relation to identity and access management (IAM). The student is expected to:

(A) identify best practices for IAM;

(B) analyze the cultural and societal impacts of cloud security;

(C) differentiate between a role, user, and policy in cloud security;

(D) identify and use a process to resolve vulnerabilities in a web server;

(E) describe cloud security best practices and explain steps to fix security lapses;

(F) identify the best cloud security service for a given scenario;

(G) demonstrate the use of an IAM system to set up a text alert event; and

(H) compare monitoring and logging services.

(4) The student describes when to use various databases, the benefits of caching data, and how to build a virtual private cloud (VPC). The student is expected to:

(A) compare online transactional processing and online analytical processing;

(B) describe the benefits of caching data;

(C) explain and demonstrate how a load balancer is attached to a webpage;

(D) describe features and benefits of load balancing;

(E) evaluate the performance of a load balancer;

(F) create an application using a platform as a service (PaaS); and

(G) demonstrate the use of a template infrastructure as code to build a VPC.

(5) The student understands the landscape of emerging technologies in the cloud. The student is expected to:

(A) define machine learning and discuss its impacts on society, business, and technology;

(B) identify potential use cases for emerging technology in the cloud;

(C) assess value propositions of using cloud technology;

(D) identify cloud services that can analyze and protect data and manage networks;

(E) define blockchain technology and explain its benefits;

(F) explain the infrastructure of cloud development kits or services; and

(G) demonstrate the use of a software development framework to model and provision a cloud application.

(6) The student resolves common security alerts, diagrams instance states and transitions, and explains how to choose the most cost-efficient instance type. The student is expected to:

(A) describe the shared responsibility security model;

(B) identify security responsibility for cloud resources;

(C) analyze how the shared security model accounts for common threats to the cloud computing model;

(D) identify the steps required to resolve an automated security alert;

(E) describe the six instance states, including pending, running, stopping, stopped, shutting down, and terminated;

(F) identify and diagram the transitions between instance states from launch to termination;

(G) explain instance usage billing for each instance state; and

(H) determine the most cost-efficient instance state for a given situation.

(7) The student differentiates between dynamic and static websites. The student is expected to:

(A) describe and demonstrate the process for setting up a static website;

(B) compare static and dynamic websites;

(C) create a content delivery network distribution to increase the speed of a website;

(D) demonstrate the process to launch a dynamic web server;

(E) create a serverless compute function using a serverless compute console;

(F) describe the main functions of auto scaling;

(G) create a launch template and an auto scaling group; and

(H) develop a plan for monitoring an auto scaling instance or group.

(8) The student demonstrates the benefits and risks of using big data. The student is expected to:

(A) define big data and identify use cases for it within various industries;

(B) identify and evaluate the benefits and risks of big data;

(C) explain how blockchain ensures the validity and immutability of transactions, particularly in the cloud; and

(D) evaluate the benefits and risks of blockchain business applications.

Source: The provisions of this §127.689 adopted to be effective August 1, 2025, 50 TexReg 3752.

§127.690. Foundations of User Experience (One Credit), Adopted 2025.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills, Adopted 2025) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 9-12. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services. This career cluster includes occupations ranging from software developer and programmer to cybersecurity specialist and network analyst.

(3) In Foundations of User Experience (UX), students analyze and assess current trends in a career field that creates meaningful, approachable, and compelling experiences for users of an array of products, services, and/or initiatives of companies, governments, and organizations. Students gain knowledge of introductory observation and research skills, basic design thinking and applied empathy methodologies, collaborative problem-solving and ideation, and interaction design and solution development. The knowledge and skills acquired from this course enable students to identify real-world problems through research and data-driven investigation and to design solutions while participating in collaborative problem solving. Students are introduced to agile practices and methodologies to develop skills to take solutions from conceptual sketch to digital designs using professional software tools. Students explore how to improve the quality of user interactions and perceptions of products, experiences, and any related services.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student applies professional communications strategies. The student is expected to:

(A) revise presentations for audience, purpose, situation, and intent;

(B) interpret and clearly communicate information, data, and observations;

(C) apply active listening skills to obtain and clarify information;

(D) identify multiple viewpoints of potential diverse users; and

(E) define and exhibit public relations skills that are used by UX designers.

(2) The student describes the field of UX and common elements in user-centered design. The student is expected to:

(A) analyze the current trends and challenges of the UX field;

(B) analyze and describe the diversity of roles and career opportunities across the UX field;

(C) define terminology associated with UX, including user, user experience, human-centered design, design thinking, persona, user journey, empathy map, mind maps, roadmaps, wireframes, prototypes, and portfolios;

(D) identify and explain the differences between relevant, friendly, and useful experience design;

(E) identify and explain the connection between psychology and behavior with regard to usability;

(F) explain the components of the design thinking methodology for ideation, iteration, co-creation, development, and execution; and

(G) explain how UX design affects everyday lives.

(3) The student discusses and applies the legal and ethical practices that UX designers follow when working with technology, designs, and clients. The student is expected to:

(A) identify and explain ethical use of technology;

(B) explain intellectual property laws, including copyright, trademarks, and patents, and consequences of violating each type of law;

(C) identify violations of intellectual property laws;

(D) explain the consequences of plagiarism; and

(E) demonstrate ethical use of online resources, including using proper citations and avoiding plagiarism.

(4) The student identifies and demonstrates introductory observation and research methods. The student is expected to:

(A) describe the difference between qualitative and quantitative data;

(B) conduct user interviews to gather insights into what users think about a site, an application, a product, or a process;

(C) organize ideas and user data using software tools;

(D) analyze and draw conclusions from qualitative user data collection;

(E) observe and document how users perform tasks through task analysis observations;

(F) define affinity and explain the benefits of affinity and customer journey maps;

(G) use data summaries from user interviews to create personas; and

(H) create a report or presentation, including user interview and observation data summaries, data analysis, and additional findings, for a target audience.

(5) The student applies an understanding of psychological principles used in user-centered design. The student is expected to:

(A) identify and define design principles;

(B) describe how visceral reactions inform the creation of a positive user experience;

(C) select colors to influence human behavior, the human mind, and reactions toward an intended outcome;

(D) explain recognition and scanning patterns and their importance in user-centered design;

(E) define Hick's Law and Weber's Law and explain their impact on UX design decisions;

(F) describe sensory adaptation phenomenon and perceptual set; and

(G) explain the stages of human information processing, including sensing, perceiving, decision-making, and acting.

(6) The student creates effective, accessible, usable, and meaningful solutions for the end user by using UX design principles. The student is expected to:

(A) identify end-user problems and needs in real-world environments;

(B) identify principles of accessibility such as perceivable, operable, understandable, and robust (POUR);

(C) identify and discuss the differences and connections between UX Design, Visual Design, and User Interaction in regard to usability;

(D) communicate potential solutions and ideas with a storytelling approach;

(E) sketch and refine designs within wire-framing and prototypes; and

(F) implement iterations for a design solution using structured testing protocols.

(7) The student collaborates with others to apply UX project management methods. The student is expected to:

(A) identify the relationship between UX research and design-thinking methods; and

(B) explain three different stages and roles of UX project management methods such as agile methods.

(8) The student applies UX design practices and uses technology to create digital assets. The student is expected to:

(A) use design elements such as typeface, color, shape, texture, space, and form to create a visual narrative;

(B) implement design principles such as unity, harmony, balance, scale, novelty, hierarchy, alignment, and contrast to create visual narratives;

(C) identify and explain common elements of Hyper Text Markup Language (HTML) such as tags, style sheets, and hyperlinks;

(D) apply UX design techniques in order to:

(i) create effective user interfaces for browser-based, native, and hybrid mobile applications;

(ii) demonstrate proper use of vector and raster-based design software;

(iii) explain the difference between back-end and front-end development in UX; and

(iv) create a web page containing links, graphics, and text using appropriate design principles;

(E) demonstrate basic sketching skills;

(F) create wireframes using design software;

(G) explain how design fidelity, from sketch to wireframe to prototype to visuals, aligns with and supports agile methodology; and

(H) produce digital assets.

Source: The provisions of this §127.690 adopted to be effective August 1, 2025, 50 TexReg 3752.

§127.691. Advanced User Experience Design (One Credit), Adopted 2025.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills, Adopted 2025) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Prerequisite: Foundations of User Experience. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, digital interactions, multimedia, and systems integration services. This career cluster includes occupations ranging from software developer and programmer to cybersecurity specialist and network analyst.

(3) The Advanced User Experience (UX) Design course allows students to apply skills in science and art to integrate technology as a useful, meaningful, memorable, and accessible source for all users. Students will use knowledge from the Foundations of User Experience course to expand the research, design process, testing, and communication skills essential for success in this user-focused career field.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student understands and demonstrates legal and ethical procedures for UX designers as they apply to the use of information technology. The student is expected to:

(A) identify intellectual property violations within given scenarios; and

(B) formulate and communicate visually, orally, or in writing the ramifications and consequences of plagiarism and copyright infringement within a business context.

(2) The student connects and applies UX design conceptual foundations with real-world scenarios. The student is expected to use proper terms and professional language for UX design context, both orally and in written form.

(3) The student uses different options of project management to produce a successful UX design. The student is expected to:

(A) identify different stages of the UX design process, including research, identification of problem, ideation, prototyping, and testing, and apply these stages to refine or create products;

(B) test partial products during the UX design process and analyze results to inform the refinement phase;

(C) explain the conceptual design, content strategy, and ways to get feedback from various users and stakeholders in the project; and

(D) demonstrate effective time-management and planning to complete project tasks.

(4) The student collects and interprets data through the use of UX tools and protocols. The student is expected to:

(A) create templates for questionnaires, data collection, and summary reports;

(B) analyze data and create a summary of project conclusions that include insights into affordances and constraints of the project design;

(C) distinguish differences in qualitative research methods such as user interviews, ethnography, field studies, focus groups, and usability testing; and

(D) identify and use quantitative methods such as A/B testing, card sorting, heat maps, analytics, and user surveys.

(5) The student creates and analyzes prototypes for UX design products. The student is expected to:

(A) identify a UX problem and list potential solutions;

(B) evaluate potential solutions and create an action plan to address a problem based on desired features and requirements for a UX design product;

(C) create a presentable content strategy and develop conceptual designs and symbolic messages for a UX design prototype;

(D) generate possible solutions with ideation methods such as unstructured discussion, storyboards, brainstorming, role playing, game storming, mind mapping, teamwork games, and sketching;

(E) refine and select ideas for prototyping with a people-centered rationale for the decision;

(F) create low-fidelity prototypes, including sketches, paper models, and click-through prototypes; and

(G) create mockups and high-fidelity prototypes, including digital and physical versions.

(6) The student structures solutions while applying UX design principles. The student is expected to:

(A) explain how the connected layouts, blocks of content, visual designs, and navigation requirements enhance user experience;

(B) explain how the distinguishing of channels and formats during website development impacts usability across different devices;

(C) develop and implement design activities for co-creation, peer-review, and collaborative feedback;

(D) test and evaluate navigation experiences and compare results with current competitors; and

(E) incorporate best practices for references, including adding the designer's voice and signature.

(7) The student describes best practices and plans for a usability test. The student is expected to:

(A) create a usability test plan that includes cognitive, perceptual, emotional, and cultural information about users, data collection requirements, and user testing methods;

(B) execute testing methodologies and collect data for analysis purposes; and

(C) present conclusions and recommendations that apply design principles, communication, and creative skills.

Source: The provisions of this §127.691 adopted to be effective August 1, 2025, 50 TexReg 3752.

§127.695. Information Technology Troubleshooting (One Credit), Adopted 2025.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills, Adopted 2025) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Prerequisite: at least one credit in a course from the Information Technology Career Cluster. Recommended prerequisites: Principles of Information Technology and Computer Maintenance/Lab. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry-level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services. This career cluster includes occupations ranging from software developer and programmer to cybersecurity specialist and network analyst.

(3) The Informational Technology Troubleshooting course is about applying logic over technical components to identify and resolve problems. The course focuses on developing a methodical approach in IT troubleshooting and leveraging those skills in a workplace environment. In this course, students learn and use proven troubleshooting methods and apply those in a collaborative workplace setting. Students develop personal success skills, including time management and personal accountability measures, strategies for collaboration and teamwork, and effective written and verbal communication skills. The knowledge and skills acquired in the course enables students to use IT resources and data safely, ethically, and within legal guidelines. Students work within a service level model that helps them to interpret, clarify, and diagnose issues with hardware, software, and networking.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student develops and models customer-service skills. The student is expected to:

(A) identify and model the characteristics of excellent customer service;

(B) list and demonstrate the steps for opening and greeting a contact;

(C) explain the benefits of using a client's name;

(D) identify habits and situations to avoid when interacting with a client;

(E) explain the importance of keeping clients informed of status changes;

(F) list and demonstrate the steps for putting a client on hold or transferring a call;

(G) identify and demonstrate techniques and strategies for handling difficult calls and situations; and

(H) document all client communications and outcomes clearly and appropriately.

(2) The student applies procedures for various support interaction types. The student is expected to:

(A) describe the primary responsibilities and skills of an IT support specialist and how to deliver consistent, quality service;

(B) explain and demonstrate safety procedures for unpacking, handling, and repacking replacement parts;

(C) describe when to use various support delivery methods and technologies such as in-person, email, phone, web, and remote access;

(D) demonstrate the use of various support delivery models, including in-person, email, phone, web, and remote access technologies, to troubleshoot an issue; and

(E) describe the purpose and value of the security management process and the IT support specialist's role in that process.

(3) The student implements proven troubleshooting methods and strategies within the context of a service level model. The student is expected to:

(A) implement and explain a troubleshooting process for diagnosing issues with hardware, software, and the network;

(B) explain the importance of clearly documenting progress throughout the troubleshooting process;

(C) describe activities common to help desk service level model and incident management processes;

(D) interpret and clarify different types of incidents, problems, and events submitted in the help desk service model or trouble ticketing system;

(E) describe an operational level agreement (OLA) and the role of the IT support specialist in an OLA;

(F) describe what is meant by escalation and the reasons an incident may be escalated;

(G) identify and apply relevant system updates for supported devices; and

(H) describe service and support center metrics, including a service level target and the IT support specialist's role in monitoring and reviewing data related to these metrics.

(4) The student describes and applies best practices for the safe, ethical, and legal use of resources and information. The student is expected to:

(A) demonstrate and describe positive digital citizenship and acceptable use policy when using digital resources;

(B) describe best practices for creating passwords such as increasing password length and password complexity, enforcing password blacklists, resetting passwords, limiting password entry attempts, and using multi-factor authentication;

(C) examine, describe, and demonstrate the use of guidelines for using media, information, and applications protected by copyright;

(D) compare and explain copyright, fair use, public domain, and Creative Commons licensing;

(E) identify and apply licensing guidelines for software, media, and other resources;

(F) explain the importance and uses of encryption;

(G) describe and demonstrate best practices for handling confidential information;

(H) analyze cyber threats and social engineering vulnerabilities and discuss ways to prevent them;

(I) describe various types of security policies and summarize the importance of physical security and logical security measures;

(J) explain the importance of reporting security compromises such as addressing prohibited content and activity; and

(K) identify and demonstrate appropriate data destruction and disposal methods relevant to a given scenario.

(5) The student applies foundational knowledge and skills for the installation, configuration, operation, and maintenance of desktops and workstations. The student is expected to:

(A) explain the procedure used to install and configure motherboards, central processing units (CPUs), and add-on cards relevant to a given scenario such as a custom personal computer configuration to meet customer specifications;

(B) describe how to implement security best practices to secure a workstation, including software-based computer protection tools such as software firewalls, antivirus software, and anti-spyware;

(C) demonstrate how to identify symptoms or error codes, including no power, no POST, no BOOT, and no video, that indicate device issues and explain how to troubleshoot symptoms or error codes;

(D) describe the process used to install, troubleshoot, and replace random-access memory (RAM) types and data storage;

(E) describe how to troubleshoot, clean, repair, or replace internal components, including heat sink units and thermal paste, exhaust vents and fans, power supply units, power adapters, batteries, wireless elements, and wireless wide area network (WWAN) components;

(F) explain the importance of conducting periodic maintenance, including both physical and electronic cleaning, disk checks, routine reboots, data dumps, and testing; and

(G) describe and demonstrate how to prevent, detect, and remove malware using appropriate tools and methods.

(6) The student applies foundational knowledge and skills about the installation, configuration, operation, and maintenance of operating systems (OS) and software. The student is expected to:

(A) describe and demonstrate the use of OS features and tools relevant to given scenarios;

(B) describe and demonstrate the use of OS utilities relevant to given scenarios;

(C) execute OS command-line tools such as ipconfig, netstat, dir, nbtstat;

(D) troubleshoot and document OS problems relevant to a given scenario;

(E) demonstrate how to use features and tools of various operating systems properly;

(F) troubleshoot and document problems in various operating systems; and

(G) explain database concepts and the purpose of a database.

(7) The student installs, configures, operates, maintains, and troubleshoots issues related to peripheral devices relevant to a given scenario. The student is expected to:

(A) explain and demonstrate how to install, configure, maintain, and troubleshoot storage devices;

(B) explain and demonstrate how to install, configure, maintain, and troubleshoot printers, copiers, and scanners, including small office home office (SOHO) multifunction devices and printers;

(C) explain and demonstrate how to install, configure, maintain, and troubleshoot video projectors and video displays; and

(D) explain and demonstrate how to install, configure, maintain, and troubleshoot multimedia devices such as sound cards, speakers, microphones, and webcams.

(8) The student monitors current issues related to the installation, configuration, operation, and maintenance of laptops, tablets, and other mobile devices, including internet of things (IoT) devices. The student is expected to:

(A) explain and demonstrate how to install and configure laptop and netbook hardware to meet customer specifications;

(B) explain and demonstrate how to install components within the display of a laptop;

(C) explain and demonstrate how to connect and configure accessories and ports of mobile devices;

(D) analyze and apply methods used to secure mobile devices;

(E) configure mobile device network connectivity and application support;

(F) demonstrate proper methods to perform mobile device synchronization such as synchronizing information to a laptop or desktop computer; and

(G) explain and demonstrate how to troubleshoot issues relevant to mobile devices, OS, and applications.

(9) The student troubleshoots issues with wired and wireless networks and cloud computing resources. The student is expected to:

(A) explain and demonstrate how to install, configure, and secure a wired network;

(B) explain and demonstrate how to install, configure, and secure a wireless network;

(C) compare wireless security protocols and authentication methods;

(D) analyze, describe, and troubleshoot wired and wireless network problems;

(E) demonstrate the use of appropriate networking tools to fix network issues safely;

(F) explain how computing devices such as laptops and cell phones connect and share data;

(G) describe the components of cloud-computing architectures and features of cloud-computing platforms; and

(H) analyze, describe, and troubleshoot cloud computing resources.

Source: The provisions of this §127.695 adopted to be effective August 1, 2025, 50 TexReg 3752.

§127.696. Engineering Applications of Computer Science Principles (One Credit), Adopted 2025.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills, Adopted 2025) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 9-12. Prerequisite: Algebra I and at least one credit in a course from the Information Technology Career Cluster. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology career cluster focuses on the design, development, support, and management of hardware, software, multimedia, and systems integration services. This career cluster includes occupations ranging from software developer and programmer to cybersecurity specialists and network analysts.

(3) Engineering Applications of Computer Science Principles teaches rigorous engineering design practices, engineering habits of mind, and the foundational tools of computer science. Students apply core computer science principles to solve engineering design challenges that cannot be solved without such knowledge and skills. Students use a variety of computer software and hardware applications to complete projects.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student applies concepts of critical thinking and problem solving to engineering applications in computer science. The student is expected to:

(A) identify, analyze, and discuss elements of an engineering problem to develop creative and innovative solutions;

(B) identify, analyze, and discuss the elements and structure of a programming problem to develop creative and innovative solutions;

(C) identify and discuss pertinent information from a customer and existing program for solving a problem;

(D) compare and discuss alternatives to a solution using a variety of problem-solving and critical-thinking skills; and

(E) conduct research to gather technical information necessary for decision making.

(2) The student conducts computer science and engineering laboratory activities using safe and environmentally appropriate practices. The student is expected to:

(A) identify and demonstrate safe practices during hands-on cutting and building activities during computer science and engineering laboratory activities;

(B) identify and demonstrate safe use and storage of electrical components; and

(C) identify and demonstrate appropriate use and conservation of resources, including disposal, reuse, or recycling of materials.

(3) The student applies ethical considerations in designing solutions. The student is expected to:

(A) define and evaluate constraints pertaining to a problem;

(B) identify safety considerations in designing engineering solutions with respect to the system, engineer, and user; and

(C) investigate and explain the importance and application of relevant legal and ethical concepts in computer science such as intellectual property, use of open-source software, attribution, patents, and trademarks.

(4) The student demonstrates an understanding of the structured methods used to collect and analyze information about customer needs. The student is expected to:

(A) analyze information provided by the customer to identify customer needs;

(B) create a process flow diagram based on customer needs to generate ideas for potential user actions, product functions, and design opportunities;

(C) develop a flowchart for a program using the results of a process flow diagram;

(D) create a target specifications table;

(E) identify and describe similar existing solutions; and

(F) construct a functional model based on customer needs to generate ideas for potential user actions, product functions, and design opportunities.

(5) The student develops a user interface and supplemental instructions. The student is expected to:

(A) identify essential tasks to be completed by the user;

(B) identify points of potential confusion or unexpected input by the user;

(C) design a software or user interface that clearly communicates to the user how to complete desired tasks;

(D) develop supplemental user instructions to inform the user of items that cannot be incorporated into an interface such as how to start the program or frequently asked questions;

(E) test a program and the program instructions with an individual who is not familiar with the project;

(F) evaluate and discuss feedback and results from new user testing;

(G) improve and refine a program and the program instructions based on feedback and results of testing; and

(H) re-test a program and the program instructions as necessary after modifications have been made in response to testing and identify any next steps.

(6) The student systematically reverse engineers a product, examines ways to improve the product, and identifies the type of redesign required to make that improvement. The student is expected to:

(A) write or perform tests, including break testing, for an existing program to determine functionality;

(B) describe unexpected findings from deconstructing existing code;

(C) examine and discuss relevant software libraries to determine their uses and functionality;

(D) construct a flowchart for an existing program;

(E) compare a program's current functionality to the customer's needs;

(F) identify and add missing customer specifications or needs to a program's flowchart;

(G) develop and explain new code that includes customer specifications or improves a product; and

(H) compare and discuss the predicted versus actual functionality of a product to generate ideas for redesign.

(7) The student applies concept generation and selection skills. The student is expected to:

(A) create and explain a black box and functional model of a system;

(B) implement brainstorming, mind mapping, concept sketching, and gallery walk activities to produce new ideas; and

(C) apply concept selection techniques such as a Pugh chart or a weighted decision matrix to design decisions.

(8) The student develops and applies engineering design process skills. The student is expected to:

(A) select and use appropriate tools and techniques to support design activities;

(B) report information about software design solutions in an engineering notebook;

(C) develop, test, and refine programming concepts throughout the development process;

(D) interpret and use an electrical diagram to build a circuit;

(E) create a circuit using a microcontroller, a breadboard, and multiple components;

(F) explain and apply the design process from different starting points by beginning with a baseline design;

(G) use a model or simulation which represents phenomena and mimics real-world events to develop and test hardware;

(H) critique and explain the usefulness and limitations of certain models;

(I) develop a prototype solution; test the prototype solution against requirements, constraints, and specifications; and refine the prototype solution; and

(J) report and describe a product's final design after the prototyping phase.

(9) The student applies mathematics and algorithms in programs. The student is expected to:

(A) apply mathematical concepts from algebra, geometry, trigonometry, or calculus to calculate the angle of a joint;

(B) apply mathematical calculations cyclically in a program using algorithms; and

(C) evaluate and verify algorithms for appropriateness and efficiency.

(10) The student develops computer programs to support design solutions. The student is expected to:

(A) design and explain software interfaces that communicate with hardware;

(B) identify and apply relevant concepts from computer science, science, and mathematics such as functions, electricity, and mechanics; and

(C) employ abstraction in a program by representing numerical sensor readouts in more intuitive variables and functions.

(11) The student develops and applies computer science skills. The student is expected to:

(A) integrate small discrete programs into a larger complete program solution using systems-thinking skills;

(B) use intuitive variable names correctly and add comments to code to improve readability;

(C) employ abstraction in a program by representing images as data arrays and representing numerical tone frequencies as variables;

(D) convert image information into the correct data type necessary for given library functions;

(E) develop an algorithm that includes logic such as "while" and "if" to accept user trackbar input and display image changes in real time;

(F) develop flowcharts, pseudocode, and commented code to document and explain software design solutions;

(G) design software interfaces that communicate with users and hardware;

(H) employ abstraction to program an interface, treating imported code as a "black box";

(I) employ abstraction by representing a joint as four points in a plane; and

(J) select and apply correct programming vocabulary and programming skills during program development.

(12) The student develops and uses computer programs to process data and information to gain insight and discover connections to support design solutions. The student is expected to:

(A) explain how to organize complex image and video data for processing;

(B) analyze complex data to make decisions and instruct users; and

(C) develop programs that use incoming data and algorithms to create output data, information, and commands.

Source: The provisions of this §127.696 adopted to be effective August 1, 2025, 50 TexReg 3752.

§127.697. Geographic Information Systems (One Credit), Adopted 2025.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills, Adopted 2025) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisites: Principles of Art, Audio/Video Technology, Principles of Information Technology, Physics for Engineers, or Principles of Applied Engineering. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology career cluster focuses on the design, development, support, and management of hardware, software, multimedia, and systems integration services. This career cluster includes occupations ranging from software developer and programmer to cybersecurity specialist and network analyst.

(3) The Geographic Information Systems (GIS) course employs an analytic process using industry standard software to find trends and patterns in collected data. Whether collecting data first-hand or from reputable websites, GIS aims to use scientific methods to find solutions to various problems and issues.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student demonstrates knowledge and appropriate use of computer hardware components and software programs and examines how hardware and software are interrelated. The student is expected to:

(A) use operating systems, software applications, and communication and networking components appropriately;

(B) compare and appropriately use various input, processing, output, and primary/secondary storage devices;

(C) evaluate and select software based on quality, appropriateness, effectiveness, and efficiency; and

(D) solve digital file format and cross platform connectivity compatibility issues.

(2) The student uses data input skills. The student is expected to:

(A) incorporate into a product and use a variety of input devices such as keyboard, scanner, or mouse appropriately; and

(B) use digital keyboarding standards for the input of data.

(3) The student demonstrates knowledge and understanding of what GIS is and the use of GIS technology in different career fields. The student is expected to:

(A) identify historical and contemporary developments in GIS;

(B) describe the basic components of GIS; and

(C) identify appropriate application of GIS technologies in different career fields.

(4) The student demonstrates knowledge and appropriate use of database software. The student is expected to:

(A) design and construct a relational database from a geographic data model using a database software;

(B) use joins, hyperlinks, and relational linking appropriately within a database;

(C) convert data into a data depiction using classifications; and

(D) transfer data from different sources into a database for storage and retrieval.

(5) The student demonstrates knowledge and appropriate use of spatial databases and sources. The student is expected to:

(A) identify and use appropriately various spatial databases and sources such as digital terrain models, digital orthophoto quadrangles, geographic databases, land use and land cover data, digital imagery, hydrographic spatial data, and demographic data; and

(B) describe and demonstrate appropriate use of spatial analysis.

(6) The student demonstrates knowledge and appropriate use of GIS software. The student is expected to:

(A) determine the appropriate software tool from GIS to use for a given task or project;

(B) create queries and spatial queries for finding features, borders, centroids, and networks and determining distance, length, and surface measurements and shapes;

(C) describe characteristics of maps and spatial data; and

(D) identify and use geographical scales, coordinates, and specific map projections.

(7) The student demonstrates knowledge and appropriate use of GIS data collection devices. The student is expected to:

(A) plan and conduct supervised GIS and Global Positioning System (GPS) experiences;

(B) initialize and prepare a GPS receiver for data collection;

(C) collect geographical coordinates from a GPS receiver; and

(D) transfer data from a GPS device to a personal computer.

(8) The student acquires electronic information in a variety of formats. The student is expected to:

(A) collect electronic information in various formats, including text, audio, video, and graphics; and

(B) gather authentic data from a variety of electronic sources to use for individual and group GIS projects.

(9) The student uses appropriate computer-based productivity tools to create and modify solutions to problems. The student is expected to:

(A) explain project management guidelines for designing and developing GIS projects; and

(B) design solutions for a project using visual organizers such as flowcharts or schematic drawings.

(10) The student produces a product using a variety of media. The student is expected to:

(A) publish information in a variety of formats, including hard copies and digital formats; and

(B) prepare a presentation of GIS information using graphs, charts, maps, and presentation software.

(11) The student examines GIS maps, reports, and graphs. The student is expected to:

(A) explain industry-standard legends used in GIS;

(B) describe symbols, scaling, and other map elements used in GIS;

(C) generate GIS reports and graphs; and

(D) create maps using a variety of map display types such as choropleth, heat maps, dot density maps, topographic maps, or graduated symbols maps.

Source: The provisions of this §127.697 adopted to be effective August 1, 2025, 50 TexReg 3752.

§127.698. Raster-Based Geographic Information Systems (One Credit), Adopted 2025.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(1) of this chapter (relating to Career and Technical Education Employability Skills, Adopted 2025) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Geographic Information Systems. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology career cluster focuses on the design, development, support, and management of hardware, software, multimedia, and systems integration services. This career cluster includes occupations ranging from software developer and programmer to cybersecurity specialist and network analyst.

(3) In Raster-Based Geographic Information Systems (GIS), students study local problems; acquire information, including images or aerial photographs; process the acquired data; and merge the acquired data with vector data. Students plan, conduct, and present solutions for locally based problems.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student demonstrates knowledge of the GIS field and related careers. The student is expected to:

(A) identify employment and career opportunities in GIS-related fields;

(B) identify and explore career preparation learning experiences, including job shadowing, mentoring, apprenticeship training, and preparation programs;

(C) identify industry certifications for GIS-related careers, including careers related to raster-based GIS; and

(D) discuss and analyze ethical issues related to GIS and technology and incorporate proper ethics in submitted projects.

(2) The student explores various roles in team projects. The student is expected to:

(A) explain the importance of teamwork in the field of GIS;

(B) describe principles of effective teamwork, including collaboration and conflict resolution; and

(C) explain common characteristics of strong team leaders and team members.

(3) The student investigates the history and use of aerial photography. The student is expected to:

(A) explain fundamental principles of cameras and lenses as they pertain to GIS and aerial photography;

(B) research and explain the history of aerial photography, including aerial platforms;

(C) explain various uses of aerial photography;

(D) compare vertical and oblique aerial photography; and

(E) identify cities, bridges, shorelines, roads and other important features in aerial photos.

(4) The student develops an understanding of electromagnetic and thermal radiation. The student is expected to:

(A) explain how forms of radiation propagate through space and interact with matter;

(B) research and describe the behavior of waves, including refraction, scattering, absorption, and reflection, in relation to radiation;

(C) describe the properties and laws of thermal radiation;

(D) compare the particle and wave models of electromagnetic energy;

(E) differentiate maps based on electromagnetic versus thermal radiation imagery; and

(F) evaluate whether electromagnetic or thermal radiation imagery is appropriate based on the conditions.

(5) The student explores active and passive microwave remote sensing. The student is expected to:

(A) compare active and passive microwave remote sensing;

(B) explain geographic characteristics, including surface roughness, moisture content, vegetation, backscatter and biomass, and urban structures, detected by remote sensing images; and

(C) provide a detailed analysis of radar images.

(6) The student learns the functions and applications of the tools, equipment, and materials used in GIS and raster-based analysis. The student is expected to:

(A) describe how to use raster-based software;

(B) download spatial data and raster images and re-project the data and images to match the Digital Orthophoto Quadrangle (DOQ) or Digital Orthophoto Quarter Quadrangle (DOQQ);

(C) identify remote sensing equipment and describe the difference between the Global Positioning System (GPS) and the Global Navigation Satellite System (GLONASS);

(D) describe GPS measurements and perform measurements with handheld GPS devices using GPS or GLONASS systems; and

(E) compare the advantages, disadvantages, and limitations of remote or unmanned sensing.

(7) The student uses scientific practices in imagery analysis. The student is expected to:

(A) plan and implement investigative procedures, including asking questions, formulating testable hypotheses, and selecting, handling, and maintaining appropriate equipment and technology;

(B) collect GIS data;

(C) organize, analyze, evaluate, make inferences, and predict trends from GIS data; and

(D) communicate valid conclusions using appropriate GIS vocabulary, supportive maps, summaries, oral reports, and technology-based reports.

(8) The student uses project-management skills to research and analyze locally based problems. The student is expected to:

(A) identify and collect data necessary to evaluate a local problem, including defining the problem and identifying locations of the concern;

(B) develop a plan and project schedule for completion of a project developed to address a local concern using raster-based GIS technology;

(C) create a GIS map to illustrate a problem using remote sensing images gathered from sites such as the National Aeronautics and Space Administration, National Oceanic and Atmospheric Administrations, and United States Geological Survey;

(D) evaluate GIS map features to identify solutions to a problem;

(E) develop solutions to minimize, reverse, or solve problem using raster-based GIS technology; and

(F) organize and present findings related to a local problem in a final report or portfolio with data and solutions generated using raster-based GIS technology.

Source: The provisions of this §127.698 adopted to be effective August 1, 2025, 50 TexReg 3752.

§127.699. Spatial Technology and Remote Sensing (One Credit), Adopted 2025.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2025-2026 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills, Adopted 2025) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Prerequisite: at least one credit in a course from the Information Technology Career Cluster. Recommended prerequisites: Geographic Information Systems and Raster-Based Geographic Information Systems. Students shall be awarded one credit for successful completion of this course.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology career cluster focuses on the design, development, support, and management of hardware, software, multimedia, and systems integration services. This career cluster includes occupations ranging from software developer and programmer to cybersecurity specialist and network analyst.

(3) In Spatial Technology and Remote Sensing, students receive instruction in industry standard geospatial extension software and geospatial tools, including global positioning systems (GPS), and training in project management and problem solving related to geographic information systems (GIS).

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student demonstrates knowledge of the GIS field and GIS-related careers. The student is expected to:

(A) identify employment and career opportunities in spatial technology and remote sensing related GIS fields;

(B) describe and explore career preparation learning experiences, including job shadowing, mentoring, apprenticeship training, and preparation programs;

(C) identify industry certifications for GIS-related careers, including careers that use or benefit from spatial technology; and

(D) analyze and discuss ethical issues related to the field of spatial technology and remote sensing technology and spatial technology and remote sensing technology projects.

(2) The student applies basic GIS software knowledge and skills to explore the use of various geographic projections in GIS software. The student is expected to:

(A) identify and use Mercator map projection;

(B) identify and use Albers conic map projection; and

(C) research and explain the evolution of and need for different map projections.

(3) The student explores the application of GPS technology. The student is expected to:

(A) define and use data terminology related to GPS;

(B) identify and use appropriately GPS receiver components;

(C) describe various applications of GPS coordinates such as locating fire hydrants, extinguishers, lighting, and parking lots; and

(D) compare the accuracy of GPS coordinates from different receivers such as smartphones, tablets, and GPS handheld devices.

(4) The student demonstrates knowledge and understanding of the types and components of unmanned remote sensing platforms. The student is expected to:

(A) identify major components of aerial, terrestrial, and submersible remote sensing platforms;

(B) determine the most appropriate remote sensing platform to use based on various conditions;

(C) differentiate the types of sensing systems used by each type of platform, including active, passive, spectrometer, radar, LiDAR, scatter meter, and laser altimeter platforms; and

(D) compare situations in which different unmanned remote sensing platforms and sensing systems might be used.

(5) The student demonstrates skills related to GIS data analysis. The student is expected to:

(A) evaluate findings and potential problems using GIS data;

(B) create models that represent collected GIS data;

(C) create, query, map, and analyze cell-based raster data; and

(D) analyze density, distance, and proximity of various data points using spatial analyst tools.

(6) The student analyzes geospatial socioeconomic data to create three-dimensional maps to demonstrate findings. The student is expected to:

(A) identify key sources of and gather and organize geospatial socioeconomic data;

(B) plan, organize, and create thematic maps;

(C) convert two-dimensional themes to a three-dimensional map to demonstrate features, distributions, and themes; and

(D) interpret, draw conclusions about, and justify findings related to geospatial socioeconomic data.

(7) The student uses spatial technology to develop and analyze a location map. The student is expected to:

(A) identify and collect data using GPS and unmanned systems and identify the boundaries and topography of a location;

(B) analyze how the location of a community impacts resources and hardships such as jobs or traffic in the community;

(C) create a map of a location that includes buildings and facilities, adjacent streets, and transportation sites using GIS software; and

(D) develop a map that includes categories for a facility's features such as restrooms, spaces allocated for core activities, emergency equipment, and excavation routes.

(8) The student documents spatial technology knowledge and skills. The student is expected to:

(A) create a spatial technology and remote sensing portfolio that includes attainment of technical skill competencies and samples of work such as location maps and spatial technology and remote sensing-based reports; and

(B) present a portfolio to peers or interested stakeholders.

Source: The provisions of this §127.699 adopted to be effective August 1, 2025, 50 TexReg 3752.

§127.720. Independent Study in Technology Applications (One Credit), Beginning with School Year 2012-2013.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2012-2013 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. Students shall be awarded one credit for successful completion of this course. Recommended prerequisite: a minimum of one credit from the courses in the Information Technology Career Cluster. This course may be taken at Grades 9-12.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) In Independent Study in Technology Applications, through the study of technology applications foundations, including technology-related terms, concepts, and data input strategies, students will communicate information in different formats and to diverse audiences using a variety of technologies. Students will learn to make informed decisions; develop and produce original work that exemplifies the standards identified by the selected profession or discipline; and publish the product in electronic media and print. Students will practice the efficient acquisition of information by identifying task requirements, using search strategies, and using technology to access, analyze, and evaluate the acquired information. By using technology as a tool that supports 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. The six strands include creativity and innovation; communication and collaboration; research and information fluency; critical thinking; problem solving, and decision making; digital citizenship; and technology operations and concepts.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) Creativity and innovation. The student demonstrates creative thinking, constructs knowledge, and develops innovative products and processes using technology. The student is expected to:

(A) apply existing knowledge to promote creativity in designing new technology products or services;

(B) design and implement procedures to track trends, set timelines, and review and evaluate progress for continual improvement in process and product;

(C) produce electronic documentation to illustrate the progress of a project;

(D) seek and respond to input from peers and professionals in delineating technological tasks and problem solving;

(E) make necessary revisions and/or proceed to the next stage of study;

(F) use technology terminology appropriate to the independent study course;

(G) develop and apply advanced creativity and innovation employed in technology applications skills;

(H) identify and solve problems, individually and with input from peers and professionals, using research methods and advanced creativity and innovation skills used in a selected profession or discipline;

(I) develop products that meet standards identified by the selected profession or discipline; and

(J) produce original work to solve an identified problem and publish a product in electronic media and print.

(2) Communication and collaboration. The student uses digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning experience of others. The student is expected to:

(A) format developed projects according to defined output specifications, including target audience and viewing environment;

(B) present findings to a panel for comment and professional response;

(C) determine and implement the best method of presenting or publishing findings;

(D) synthesize and publish information in a variety of print or digital formats;

(E) use evolving network and Internet resources and appropriate technology skills to create, exchange, and publish information;

(F) develop cultural understanding and global awareness by interacting with learners of other cultures through evolving digital formats and communication methods;

(G) collaborate with others to identify a problem to be solved, hypotheses, and strategies to accomplish a task;

(H) participate with electronic communities as a learner, initiator, contributor, and facilitator/mentor; and

(I) participate in relevant, meaningful activities in the larger community and society to create electronic projects.

(3) Research and information fluency. The student applies digital tools to gather, evaluate, and use information. The student is expected to:

(A) use evolving network and Internet resources for research and resource sharing of technology applications;

(B) apply appropriate search strategies in the acquisition of information from the Internet, including keyword and Boolean search strategies;

(C) pose hypotheses and questions related to a selected problem;

(D) acquire information using appropriate research strategies with source citations through electronic formats, including interactive components, text, audio, video, graphics, and simulations; and

(E) identify, create, and use available file formats, including text, image, video, and audio files.

(4) Critical thinking, problem solving, and decision making. The student uses critical-thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. The student is expected to:

(A) evaluate the design, functionality, and accuracy of the accessed information;

(B) conduct systematic research;

(C) demonstrate creative-thinking and problem-solving skills;

(D) integrate appropriate productivity tools, including network, mobile access, and multimedia tools, in the creation of solutions to problems;

(E) use enriched curricular content in the creation of products;

(F) synthesize and generate new information from data gathered from electronic resources;

(G) read and use technical documentation; and

(H) write simple technical documentation relative to the audience.

(5) Digital citizenship. The student understands human, cultural, and societal issues related to technology and practices legal and ethical behavior. The student is expected to:

(A) discuss intellectual property, privacy, sharing of information, copyright laws, and software licensing agreements;

(B) model ethical acquisition and use of digital information;

(C) model respect of intellectual property when editing graphics, video, text, and sound files;

(D) demonstrate proper etiquette, responsible use of software, and knowledge of acceptable use policies when using network resources;

(E) demonstrate best practices in understanding and applying information security;

(F) develop and maintain a technical documentation library in a variety of formats; and

(G) investigate how technology has changed and the social and ethical ramifications of computer usage.

(6) Technology operations and concepts. The student demonstrates a sound understanding of technology concepts, systems, and operations. The student is expected to:

(A) demonstrate knowledge and appropriate use of input devices, operating systems, software applications, and communication and networking components;

(B) select, acquire, and use appropriate digital tools;

(C) delineate and make necessary adjustments regarding compatibility issues, including digital file formats and cross-platform connectivity; and

(D) use appropriate technology terminology and naming conventions.

Source: The provisions of this §127.720 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.721. Independent Study in Evolving/Emerging Technologies (One Credit).

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. Students shall be awarded one credit for successful completion of this course. Recommended prerequisite: a minimum of one credit from the courses in the Information Technology Career Cluster. This course may be taken at Grades 9-12.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) In the Independent Study in Evolving/Emerging Technologies course, through the study of evolving/emerging technologies, including technology-related terms, concepts, and data input strategies, students will communicate information in different formats and to diverse audiences using a variety of technologies. Students will learn to make informed decisions, develop and produce original work that exemplifies the standards identified by the selected profession or discipline, and publish the product in electronic media and print. Students will demonstrate efficient acquisition of information by identifying task requirements, using search strategies, and using technology to access, analyze, and evaluate the acquired information. By using technology as a tool that supports 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. The six strands include creativity and innovation; communication and collaboration; research and information fluency; critical thinking; problem solving, and decision making; digital citizenship; and technology operations and concepts.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) Creativity and innovation. The student demonstrates creative thinking, constructs knowledge, and develops innovative products and processes using technology. The student is expected to:

(A) apply existing knowledge to promote creativity in designing new technology products or services;

(B) design and implement procedures to track trends, set timelines, and review and evaluate progress for continual improvement in process and product;

(C) produce electronic documentation to illustrate the progress of a project;

(D) seek and respond to input from peers and professionals in delineating technological tasks and problem solving;

(E) make necessary revisions and/or proceed to the next stage of study;

(F) use technology terminology appropriate to the independent study course;

(G) develop and apply advanced creativity and innovation employed in technology applications skills;

(H) identify and solve problems, individually and with input from peers and professionals, using research methods and advanced creativity and innovation skills used in a selected profession or discipline;

(I) develop products that meet standards identified by a selected profession or discipline; and

(J) produce original work to solve an identified problem and publish a product in electronic media and print.

(2) Communication and collaboration. The student uses digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning experience of others. The student is expected to:

(A) format developed projects according to defined output specifications, including target audience and viewing environment;

(B) present findings to a panel for comment and professional response;

(C) determine and implement the best method of presenting or publishing findings;

(D) synthesize and publish information in a variety of print or digital formats;

(E) use evolving network resources and appropriate technology skills to create, exchange, and publish information;

(F) develop cultural understanding and global awareness by interacting with learners of other cultures through evolving digital formats and communication methods;

(G) collaborate with others to identify a problem to be solved, hypotheses, and strategies to accomplish a task;

(H) participate with electronic communities as a learner, initiator, contributor, and facilitator/mentor; and

(I) participate in relevant, meaningful activities in the larger community and society to create electronic projects.

(3) Research and information fluency. The student applies digital tools to gather, evaluate, and use information. The student uses a variety of strategies to acquire information from electronic resources, with appropriate supervision. The student is expected to:

(A) use evolving network and Internet resources for research and resource sharing of technology applications;

(B) apply appropriate search strategies in the acquisition of information from the Internet, including keyword and Boolean search strategies;

(C) pose hypotheses and questions related to a selected problem;

(D) acquire information using appropriate research strategies with source citations through electronic formats, including interactive components, text, audio, video, graphics, and simulations; and

(E) identify, create, and use available file formats, including text, image, video, and audio files.

(4) Critical thinking, problem solving, and decision making. The student uses critical-thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. The student is expected to:

(A) evaluate the design, functionality, and accuracy of the accessed information;

(B) conduct systematic research;

(C) demonstrate creative-thinking and problem-solving skills;

(D) integrate appropriate productivity tools, including network, mobile access, and multimedia tools, in the creation of solutions to problems;

(E) use enriched curricular content in the creation of products;

(F) synthesize and generate new information from data gathered from electronic resources;

(G) read and use technical documentation; and

(H) write simple technical documentation relative to the audience.

(5) Digital citizenship. The student understands human, cultural, and societal issues related to technology and practices legal and ethical behavior. The student is expected to:

(A) discuss intellectual property, privacy, sharing of information, copyright laws, and software licensing agreements;

(B) model ethical acquisition and use of digital information;

(C) model respect of intellectual property when editing graphics, video, text, and sound files;

(D) demonstrate proper etiquette, responsible use of software, and knowledge of acceptable use policies when using network resources;

(E) demonstrate best practices in understanding and applying information security;

(F) develop and maintain a technical documentation library in a variety of formats; and

(G) investigate how technology has changed and the social and ethical ramifications of computer usage.

(6) Technology operations and concepts. The student demonstrates a sound understanding of technology concepts, systems, and operations. The student is expected to:

(A) demonstrate knowledge and appropriate use of input devices, operating systems, software applications, and communication and networking components;

(B) select, acquire, and use appropriate digital tools;

(C) delineate and make necessary adjustments regarding compatibility issues, including digital file formats and cross-platform connectivity; and

(D) use appropriate technology terminology and naming conventions.

Source: The provisions of this §127.721 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.722. Advanced Placement (AP) Computer Science A (Two Credits).

(a) General requirements. This course is in a career and technical education (CTE) program of study. Students shall be awarded two credits for successful completion of this course. Recommended prerequisites: Algebra I or a student should be comfortable with functions and the concepts found in the uses of functional notation such as $f(x) = x + 2$ and $f(x) = g(h(x))$.

(b) Content requirements. Content requirements for Advanced Placement (AP) Computer Science A are prescribed in the College Board Publication Advanced Placement Course Description: Computer Science A, published by The College Board.

Source: The provisions of this §127.722 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.723. Advanced Placement (AP) Computer Science Principles (One Credit).

(a) General requirements. This course is in a career and technical education (CTE) program of study. Students shall be awarded one credit for successful completion of this course. Recommended prerequisite: Algebra I.

(b) Content requirements. Content requirements for Advanced Placement (AP) Computer Science Principles are prescribed in the College Board Publication Advanced Placement® Curriculum Framework: AP Computer Science Principles, published by The College Board.

Source: The provisions of this §127.723 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.724. International Baccalaureate (IB) Computer Science Standard Level (Two Credits)

(a) General requirements. This course is in a career and technical education (CTE) program of study. Students shall be awarded two credits for successful completion of this course. Recommended prerequisites: Computer Science I, Algebra II.

(b) Content requirements. Content requirements for IB Computer Science Standard Level are prescribed by the International Baccalaureate Organization. Subject guides may be obtained from International Baccalaureate of North America.

Source: The provisions of this §127.724 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.725. International Baccalaureate (IB) Computer Science Higher Level (Two Credits).

(a) General requirements. This course is in a career and technical education (CTE) program of study. Students shall be awarded two credits for successful completion of this course. Recommended prerequisites: Computer Science I, Algebra II.

(b) Content requirements. Content requirements for IB Computer Science Higher Level are prescribed by the International Baccalaureate Organization. Subject guides may be obtained from International Baccalaureate of North America.

Source: The provisions of this §127.725 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.726. International Baccalaureate (IB) Digital Society Standard Level (Two Credits).

(a) General requirements. Students shall be awarded two credits for successful completion of this course. Recommended prerequisites: Computer Science I, Algebra II.

(b) Content requirements. Content requirements for IB Digital Society Standard Level are prescribed by the International Baccalaureate Organization. Subject guides may be obtained from International Baccalaureate of North America.

Source: The provisions of this §127.726 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.727. International Baccalaureate (IB) Digital Society Higher Level (Two Credits).

(a) General requirements. Students shall be awarded two credits for successful completion of this course. Recommended prerequisites: Computer Science I, Algebra II.

(b) Content requirements. Content requirements for IB Digital Society Higher Level are prescribed by the International Baccalaureate Organization. Subject guides may be obtained from International Baccalaureate of North America.

Source: The provisions of this §127.727 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.735. Practicum in Information Technology (Two Credits), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grade 12. Prerequisite: a minimum of two high school information technology (IT) courses. Students shall be awarded two credits for successful completion of this course. A student may repeat this course once for credit provided that the student is experiencing different aspects of the industry and demonstrating proficiency in additional and more advanced knowledge and skills.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) In the Practicum in Information Technology, students will gain advanced knowledge and skills in the application, design, production, implementation, maintenance, evaluation, and assessment of products, services, and systems. Knowledge and skills in the proper use of analytical skills and application of IT concepts and standards are essential to prepare students for success in a technology-driven society. Critical thinking, IT experience, and product development may be conducted in a classroom setting with an industry mentor, as an unpaid or paid internship, as part of a capstone project, or as career preparation.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student identifies various employment opportunities in the IT 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 resume that includes letters of recommendation and a portfolio appropriate to a chosen career plan; and

(C) illustrate interview skills for successful job placement.

(2) The student applies academic 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 IT industry standards;

(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.

(3) The student selects an approach for conducting research to discover a problem in the field of IT with the appropriate supervision and guidance. The student is expected to:

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

(B) describe and use an approach such as top-down or bottom-up for conducting a research activity.

(4) The student creates a technological solution for a problem in the field of IT. The student is expected to:

(A) apply critical-thinking strategies to develop a solution using appropriate technologies and resources, IT 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.

(5) The student designs, creates, and implements a product or service that addresses a problem in the field of IT 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.

(6) 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 IT industry standards.

Source: The provisions of this §127.735 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.736. Extended Practicum in Information Technology (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grade 12. The practicum course is a paid or unpaid capstone experience for students participating in a coherent sequence of career and technical education courses in the Information Technology Career Cluster. Prerequisite: a minimum of two high school information technology courses. Corequisite: Practicum in Information Technology. This course must be taken concurrently with Practicum in Information Technology and may not be taken as a stand-alone course. Students shall be awarded one credit for successful completion of this course. A student may repeat this course once for credit provided that the student is experiencing different aspects of the industry and demonstrating proficiency in additional and more advanced knowledge and skills.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) In Extended Practicum in Information Technology, students will gain advanced knowledge and skills in the application, design, production, implementation, maintenance, evaluation, and

assessment of products, services, and systems. Knowledge and skills in the proper use of analytical skills and application of IT concepts and standards are essential to prepare students for success in a technology-driven society. Critical thinking, IT experience, and product development may be conducted in a classroom setting with an instructor, with an industry mentor, or both.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student applies professional communications strategies. The student is expected to:

(A) demonstrate proper use of written, verbal, and visual communication techniques consistent with IT industry standards with increased proficiency;

(B) apply active listening skills to obtain and clarify information;

(C) create and deliver formal and informal presentations in an effective manner; and

(D) exhibit public relations skills to maintain internal and external customer/client satisfaction.

(2) The student implements advanced problem-solving methods. The student is expected to:

(A) employ critical-thinking skills with increased fluency both independently and in groups to solve problems and make decisions;

(B) apply critical-thinking strategies with increased fluency to develop solutions using appropriate technologies and resources, IT concepts, and industry standards; and

(C) apply decision-making techniques with increased fluency to choose a technology-based solution.

(3) The student understands and applies proper safety and security techniques in the workplace. The student is expected to:

(A) demonstrate an understanding of and consistently follow IT security rules, regulations, and procedures; and

(B) develop and implement security management plans to address security requirements.

(4) The student understands the professional, ethical, and legal responsibilities in IT. The student is expected to:

(A) demonstrate a positive, productive work ethic by performing assigned tasks as directed;

(B) describe and practice ethical and legal responsibilities associated with the field of IT;

(C) show integrity by choosing the ethical course of action when making decisions; and

(D) comply with all applicable rules, laws, and regulations in a consistent manner.

(5) The student participates in a supervised IT experience. The student is expected to:

(A) design, create, and implement a product or service that addresses a problem or meets a specified need in the field of IT;

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

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

(D) develop an evaluation method to analyze the effect of the product or service on client satisfaction and problem resolution; and

(E) collect representative work samples.

Source: The provisions of this §127.736 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.737. Computer Technician Practicum (Two Credits), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisites: Principles of Information Technology, Computer Maintenance, Computer Maintenance Lab, Networking, and Networking Lab. Students shall be awarded two credits for successful completion of this course. A student may repeat this course once for credit provided that the student is experiencing different aspects of the industry and demonstrating proficiency in additional and more advanced knowledge and skills.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) In the Computer Technician Practicum, students will gain knowledge and skills in the area of computer technologies, including advanced knowledge of electrical and electronic theory, computer principles, and components related to the installation, diagnosis, service, and repair of computer-based technology systems. Students will reinforce, apply, and transfer their knowledge and skills to a variety of settings and problems. Proper use of analytical skills and application of IT concepts and standards are essential to prepare students for success in a technology-driven society. Critical thinking, IT experience, and product development may be conducted in a classroom setting with an instructor, with an industry mentor, or both.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student identifies various employment opportunities in the IT 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 resume appropriate to a chosen career plan, including letters of recommendation; and

(C) illustrate interview skills for successful job placement.

(2) 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.

(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 IT industry standards;

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

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

(4) 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 and analog 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.

(5) 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.

(6) 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, IT concepts, and IT 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 analyze and evaluate 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 develop 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.

(7) The student employs project management knowledge to oversee IT projects. The student is expected to:

(A) implement project methodologies, including initiating, planning, executing, monitoring and controlling, and closing a project, 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 or participate with cross-functional teams to achieve IT project goals;

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

(F) create a contingency plan.

(8) The student recognizes and analyzes potential IT 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 IT crimes and security breaches.

(9) 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;

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

(G) create written documentation indicating the cause of and solution to the problem.

(10) The student demonstrates and applies knowledge of security risks and safeguards. The student is expected to:

(A) install security software;

(B) update security software; and

(C) use security software to clean an infected machine.

(11) 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.

(12) 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 IT industry standards.

Source: The provisions of this §127.737 adopted to be effective August 1, 2025, 50 TexReg 4421.

§127.738. Extended Computer Technician Practicum (One Credit), Adopted 2015.

(a) Implementation.

(1) The provisions of this section shall be implemented by school districts beginning with the 2017-2018 school year.

(2) School districts shall implement the employability skills student expectations listed in §127.15(d)(2) of this chapter (relating to Career and Technical Education Employability Skills) as an integral part of this course.

(b) General requirements. This course is recommended for students in Grades 10-12. The practicum course is a paid or unpaid capstone experience for students participating in a coherent sequence of career and technical education courses in the Information Technology Career Cluster. Recommended prerequisites: Principles of Information Technology, Computer Maintenance, Computer Maintenance Lab, Networking, and Networking Lab. Corequisite: Computer Technician Practicum. This course must be taken concurrently with Computer Technician Practicum and may not be taken as a stand-alone course. Students shall be awarded one credit for successful completion of this course. A student may repeat this course once for credit provided that the student is experiencing different aspects of the industry and demonstrating proficiency in additional and more advanced knowledge and skills.

(c) Introduction.

(1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.

(2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

(3) In the Extended Computer Technician Practicum, students will gain knowledge and skills in the area of computer technologies, including advanced knowledge of electrical and electronic theory, computer principles, and components related to the installation, diagnosis, service, and repair of computer-based technology systems. Students will reinforce, apply, and transfer their knowledge and skills to a variety of settings and problems. Proper use of analytical skills and application of IT concepts and standards are essential to prepare students for success in a technology-driven society. Critical thinking, IT experience, and product development may be conducted in a classroom setting with an instructor, with an industry mentor, or both.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other organizations that foster leadership and career development in the profession such as student chapters of related professional associations.

(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.

(d) Knowledge and skills.

(1) The student applies professional communications strategies. The student is expected to:

(A) demonstrate proper use of written, verbal, and visual communication techniques consistent with IT industry standards with increased proficiency;

(B) analyze, interpret, and effectively communicate information;

(C) apply active listening skills to obtain and clarify information; and

(D) exhibit public relations skills to maintain internal and external customer/client satisfaction.

(2) The student implements advanced problem-solving methods. The student is expected to employ critical-thinking skills with increased fluency both independently and in groups to solve problems and make decisions.

(3) The student understands and applies proper safety and security techniques in the workplace. The student is expected to:

(A) demonstrate an understanding of and consistently follow IT security rules, regulations, and procedures;

(B) recognize and analyze potential IT security threats and address security by installing and updating security software and using security software to clean an infected machine;

(C) identify the range of security needs and the problems that can occur due to security lapses with increased proficiency;

(D) demonstrate safe use of computer technology equipment such as hand and power tools with increased proficiency; and

(E) demonstrate the proper handling and disposal of environmentally hazardous materials used in computer technologies in a consistent manner.

(4) The student understands the professional, ethical, and legal responsibilities in IT. The student is expected to:

(A) demonstrate a positive, productive work ethic by performing assigned tasks as directed;

(B) describe and practice ethical and legal responsibilities associated with the field of IT;

(C) show integrity by choosing the ethical course of action when making decisions; and

(D) comply with all applicable rules, laws, and regulations in a consistent manner.

(5) The student participates in a supervised IT experience. The student is expected to:

(A) select and use the appropriate technological resources to conduct, document, and evaluate learning activities in a supervised IT experience;

(B) read and interpret technical documentation such as schematics, drawings, charts, diagrams, technical manuals, and bulletins with increased fluency;

(C) employ available reference tools, materials, and Internet sources with increased fluency to access information as needed;

(D) develop solutions using appropriate technologies, IT concepts, and IT industry standards with increased proficiency;

(E) implement project methodologies to manage information system projects; and

(F) collect representative work samples.

Source: The provisions of this §127.738 adopted to be effective August 1, 2025, 50 TexReg 4421.