CSTA K-12 Computer Science Standards: Mapped to STEM Cluster Topics

		STEM Cluster Topics									
Standard	**Description**	**SCC01** Academic Foundations	**SCC02** Communications	**SCC03** Problem-Solving & Critical Thinking	**SCC04** Information Technology Applications	**SCC05** Systems	**SCC06** Safety, Health & Environmental	**SCC07** Leadership and Teamwork	**SCC08** Ethics & Legal Responsibilities	**SCC09** Employability & Career Development	**SCC10** Technical Skills
	CT: Computational Thinking										
CT.L2-01	Use the basic steps in algorithmic problem-solving to design solutions (e.g., problem statement and exploration, examination of sample instances, design, implementing a solution, testing, evaluation).	✓		✓	✓	✓					
CT.L2-02	Describe the process of parallelization as it relates to problem solving.	✓	✓								
CT.L2-03	Define an algorithm as a sequence of instructions that can be processed by a computer.										
CT.L2-04	Evaluate ways that different algorithms may be used to solve the same problem.			✓	✓						
CT.L2-05	Act out searching and sorting algorithms.			✓	✓						
CT.L2-06	Describe and analyze a sequence of instructions being followed (e.g., describe a character's behavior in a video game as driven by rules and algorithms).			✓	✓						
CT.L2-07	Represent data in a variety of ways including text, sounds, pictures, and numbers.	✓	✓		✓						✓
CT.L2-08	Use visual representations of problem states, structures, and data (e.g., graphs, charts, network diagrams, flowcharts).	✓	✓	✓	✓						✓
CT.L2-09	Interact with content-specific models and simulations (e.g., ecosystems, epidemics, molecular dynamics) to support learning and research.	✓			✓						
CT.L2-10	Evaluate what kinds of problems can be solved using modeling and simulation.			✓	✓						
CT.L2-11	Analyze the degree to which a computer model accurately represents the real world.			✓	✓						
CT.L2-12	Use abstraction to decompose a problem into sub problems.			✓							
CT.L2-13	Understand the notion of hierarchy and abstraction in computing, including high level languages, translation, instruction set, and logic circuits.			✓	✓						
CT.L2-14	Examine connections between elements of mathematics and computer science including binary numbers, logic, sets and functions.	✓			✓						
CT.L2-15	Provide examples of interdisciplinary applications of computational thinking.	✓									
CT.L3A-01	Use predefined functions and parameters, classes and methods to divide a complex problem into simpler parts.			✓	✓						
CT.L3A-02	Describe a software development process used to solve software problems (e.g., design, coding, testing, verification).	✓	✓	✓	✓	✓					
CT.L3A-03	Explain how sequence, selection, iteration, and recursion are building blocks of algorithms.	✓	✓	✓	✓						
CT.L3A-04	Compare techniques for analyzing massive data collections.	✓	✓	✓	✓						✓
CT.L3A-05	Describe the relationship between binary and hexadecimal representations.	✓	✓								
CT.L3A-06	Analyze the representation and trade-offs among various forms of digital information.	✓	✓	✓	✓						✓
CT.L3A-07	Describe how various types of data are stored in a computer system.	✓	✓		✓						
CT.L3A-08	Use modeling and simulation to represent and understand natural phenomena.	✓	✓	✓	✓						
CT.L3A-09	Discuss the value of abstraction to manage problem complexity.	✓	✓	✓							
CT.L3A-10	Describe the concept of parallel processing as a strategy to solve large problems.	✓	✓	✓							

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	CT: Computational Thinking (continued)										
CT.L3A-11	Describe how computation shares features with art and music by translating human intention into an artifact.	✓	✓								
CT.L3B-01	Classify problems as tractable, intractable, or computationally unsolvable.			✓							
CT.L3B-02	Explain the value of heuristic algorithms to approximate solutions for intractable problems.	✓	✓	✓	✓						
CT.L3B-03	Critically examine classical algorithms and implement an original algorithm.			✓							
CT.L3B-04	Evaluate algorithms by their efficiency, correctness, and clarity.			✓							
CT.L3B-05	Use data analysis to enhance understanding of complex natural and human systems.	✓		✓	✓						✓
CT.L3B-06	Compare and contrast simple data structures and their uses (e.g., arrays and lists).	✓	✓	✓	✓						
CT.L3B-07	Discuss the interpretation of binary sequences in a variety of forms (e.g., instructions, numbers, text, sound, image).	✓	✓		✓						
CT.L3B-08	Use models and simulations to help formulate, refine, and test scientific hypotheses.	✓		✓	✓						
CT.L3B-09	Analyze data and identify patterns through modeling and simulation.	✓		✓	✓						✓
CT.L3B-10	Decompose a problem by defining new functions and classes.			✓	✓						
CT.L3B-11	Demonstrate concurrency by separating processes into threads and dividing data into parallel streams.			✓	✓						
	CL: Collaboration										
CL.L2-01	Apply productivity/ multimedia tools and peripherals to group collaboration and support learning throughout the curriculum.		✓	✓	✓	✓		✓			
CL.L2-02	Collaboratively design, develop, publish, and present products (e.g., videos, podcasts, websites) using technology resources that demonstrate and communicate curriculum concepts.	✓	✓	✓	✓	✓		✓			✓
CL.L2-03	Collaborate with peers, experts, and others using collaborative practices such as pair programming, working in project teams, and participating in group active learning activities.		✓	✓	✓	✓		✓			
CL.L2-04	Exhibit dispositions necessary for collaboration: providing useful feedback, integrating feedback, understanding and accepting multiple perspectives, socialization.	✓	✓	✓		✓		✓		✓	
CL.L3A-01	Work in a team to design and develop a software artifact.			✓	✓	✓		✓			
CL.L3A-02	Use collaborative tools to communicate with project team members (e.g., discussion threads, wikis, blogs, version control, etc.).	✓	✓	✓	✓	✓		✓			
CL.L3A-03	Describe how computing enhances traditional forms and enables new forms of experience, expression, communication, and collaboration.				✓	✓					
CL.L3A-04	Identify how collaboration influences the design and development of software products.			✓	✓	✓		✓			
CL.L3B-01	Use project collaboration tools, version control systems, and Integrated Development Environments (IDEs) while working on a collaborative software project.		✓	✓	✓	✓		✓			
CL.L3B-02	Demonstrate the software life cycle process by participating on a software project team.			✓	✓	✓		✓			
CL.L3B-03	Evaluate programs written by others for readability and usability.	✓		✓				✓			

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	CPP: Computing Practice and Programming										
CPP.L2-01	Select appropriate tools and technology resources to accomplish a variety of tasks and solve problems.			✓	✓						
CPP.L2-02	Use a variety of multimedia tools and peripherals to support personal productivity and learning throughout the curriculum.				✓						
CPP.L2-03	Design, develop, publish, and present products (e.g., webpages, mobile applications, animations) using technology resources that demonstrate and communicate curriculum concepts.	✓	✓		✓						✓
CPP.L2-04	Demonstrate an understanding of algorithms and their practical application.			✓	✓						
CPP.L2-05	Implement problem solutions using a programming language, including: looping behavior, conditional statements, logic, expressions, variables, and functions.			✓	✓						
CPP.L2-06	Demonstrate good practices in personal information security, using passwords, encryption, and secure transactions.										✓
CPP.L2-07	Identify interdisciplinary careers that are enhanced by computer science.	✓								✓	
CPP.L2-08	Demonstrate dispositions amenable to open-ended problem solving and programming (e.g., comfort with complexity, persistence, brainstorming, adaptability, patience, propensity to tinker, creativity, accepting challenge).	✓		✓	✓			✓		✓	
CPP.L2-09	Collect and analyze data that is output from multiple runs of a computer program.	✓		✓	✓						✓
CPP.L3A-01	Create and organize web pages through the use of a variety of web programming design tools.	✓	✓		✓						✓
CPP.L3A-02	Use mobile devices/ emulators to design, develop, and implement mobile computing applications.			✓	✓						✓
CPP.L3A-03	Use various debugging and testing methods to ensure program correctness (e.g., test cases, unit testing, white box, black box, integration testing)	✓		✓	✓						
CPP.L3A-04	Apply analysis, design, and implementation techniques to solve problems (e.g., use one or more software lifecycle models).			✓	✓						
CPP.L3A-05	Use Application Program Interfaces (APIs) and libraries to facilitate programming solutions.			✓	✓						
CPP.L3A-06	Select appropriate file formats for various types and uses of data.			✓	✓						✓
CPP.L3A-07	Describe a variety of programming languages available to solve problems and develop systems.			✓	✓						
CPP.L3A-08	Explain the program execution process.	✓	✓		✓						
CPP.L3A-09	Explain the principles of security by examining encryption, cryptography, and authentication techniques.	✓	✓								
CPP.L3A-10	Explore a variety of careers to which computing is central.	✓								✓	
CPP.L3A-11	Describe techniques for locating and collecting small and large-scale data sets.	✓	✓	✓	✓						✓
CPP.L3A-12	Describe how mathematical and statistical functions, sets, and logic are used in computation.	✓	✓	✓	✓						
CPP.L3B-01	Use advanced tools to create digital artifacts (e.g., web design, animation, video, multimedia).		✓		✓						

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	CPP: Computing Practice and Programming (continued)										
CPP.L3B-02	Use tools of abstraction to decompose a large-scale computational problem (e.g., procedural abstraction, object-oriented design, functional design).			✓	✓						✓
CPP.L3B-03	Classify programming languages based on their level and application domain.			✓	✓						
CPP.L3B-04	Explore principles of system design in scaling, efficiency, and security.			✓	✓						
CPP.L3B-05	Deploy principles of security by implementing encryption and authentication strategies.				✓						
CPP.L3B-06	Anticipate future careers and the technologies that will exist.	✓								✓	
CPP.L3B-07	Use data analysis to enhance understanding of complex natural and human systems.	✓		✓	✓						✓
CPP.L3B-08	Deploy various data collection techniques for different types of problems.	✓		✓	✓						✓
	CD: Computers and Communication Devices										
CD.L2-01	Recognize that computers are devices that execute programs.										✓
CD.L2-02	Identify a variety of electronic devices that contain computational processors.										✓
CD.L2-03	Demonstrate an understanding of the relationship between hardware and software.				✓						✓
CD.L2-04	Use developmentally appropriate, accurate terminology when communicating about technology.	✓	✓		✓						✓
CD.L2-05	Apply strategies for identifying and solving routine hardware problems that occur during everyday computer use.			✓	✓						✓
CD.L2-06	Describe the major components and functions of computer systems and networks.				✓						✓
CD.L2-07	Describe what distinguishes humans from machines, focusing on human intelligence versus machine intelligence and ways we can communicate.	✓	✓								
CD.L2-08	Describe ways in which computers use models of intelligent behavior (e.g., robot motion, speech and language understanding, and computer vision).	✓	✓								
CD.L3A-01	Describe the unique features of computers embedded in mobile devices and vehicles (e.g., cell phones, automobiles, airplanes).	✓	✓								
CD.L3A-02	Develop criteria for purchasing or upgrading computer system hardware.				✓						✓
CD.L3A-03	Describe the principal components of computer organization (e.g., input, output, processing, and storage).	✓			✓						✓
CD.L3A-04	Compare various forms of input and output.	✓	✓		✓						✓
CD.L3A-05	Explain the multiple levels of hardware and software that support program execution (e.g., compilers, interpreters, operating systems, networks).	✓	✓		✓						✓
CD.L3A-06	Apply strategies for identifying and solving routine hardware and software problems that occur in everyday life.			✓	✓						✓
CD.L3A-07	Compare and contrast client-server and peer-to-peer network strategies.	✓	✓	✓		✓					✓
CD.L3A-08	Explain the basic components of computer networks (e.g., servers, file protection, routing, spoolers and queues, shared resources, and fault-tolerance).	✓	✓		✓						✓
CD.L3A-09	Describe how the Internet facilitates global communication.	✓	✓		✓						
CD.L3A-10	Describe the major applications of artificial intelligence and robotics.	✓	✓		✓						
CD.L3B-01	Discuss the impact of modifications on the functionality of application programs.	✓	✓								

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	CD: Computers and Communication Devices (continued)										
CD.L3B-02	Identify and describe hardware (e.g., physical layers, logic gates, chips, components).										
CD.L3B-03	Identify and select the most appropriate file format based on trade-offs (e.g., accuracy, speed, ease of manipulation).			✓	✓						
CD.L3B-04	Describe the issues that impact network functionality (e.g., latency, bandwidth, firewalls, server capability).	✓	✓		✓						✓
CD.L3B-05	Explain the notion of intelligent behavior through computer modeling and robotics.	✓	✓		✓						
	CI: Community, Global, and Ethical Impacts										
CI.L2-01	Exhibit legal and ethical behaviors when using information and technology and discuss the consequences of misuse.							✓	✓	✓	
CI.L2-02	Demonstrate knowledge of changes in information technologies over time and the effects those changes have on education, the workplace, and society.					✓				✓	
CI.L2-03	Analyze the positive and negative impacts of computing on human culture.	✓	✓					✓			
CI.L2-04	Evaluate the accuracy, relevance, appropriateness, comprehensiveness, and bias of electronic information sources concerning real-world problems.	✓	✓	✓							✓
CI.L2-05	Describe ethical issues that relate to computers and networks (e.g., security, privacy, ownership, and information sharing).	✓	✓					✓	✓		
CI.L2-06	Discuss how the unequal distribution of computing resources in a global economy raises issues of equity, access, and power.	✓	✓			✓		✓	✓		
CI.L3A-01	Compare appropriate and inappropriate social networking behaviors.	✓	✓					✓			
CI.L3A-02	Discuss the impact of computing technology on business and commerce (e.g., automated tracking of goods, automated financial transactions, e-commerce, cloud computing).	✓	✓			✓		✓			
CI.L3A-03	Describe the role that adaptive technology can play in the lives of people with special needs.	✓	✓					✓	✓		
CI.L3A-04	Compare the positive and negative impacts of technology on culture (e.g., social networking, delivery of news and other public media, and intercultural communication).	✓	✓					✓			
CI.L3A-05	Describe strategies for determining the reliability of information found on the Internet.	✓	✓	✓	✓						✓
CI.L3A-06	Differentiate between information access and information distribution rights.	✓	✓						✓		✓
CI.L3A-07	Describe how different kinds of software licenses can be used to share and protect intellectual property.	✓	✓						✓		✓
CI.L3A-08	Discuss the social and economic implications associated with hacking and software piracy.	✓	✓						✓		✓
CI.L3A-09	Describe different ways in which software is created and shared and their benefits and drawbacks (commercial software, public domain software, open source development).	✓	✓	✓					✓		✓
CI.L3A-10	Describe security and privacy issues that relate to computer networks.	✓	✓						✓		✓
CI.L3A-11	Explain the impact of the digital divide on access to critical information.	✓	✓						✓		✓
CI.L3B-01	Demonstrate ethical use of modern communication media and devices.							✓	✓		✓
CI.L3B-02	Analyze the beneficial and harmful effects of computing innovations.	✓		✓							

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	CI: Community, Global, and Ethical Impacts (continued)										
CI.L3B-03	Summarize how financial markets, transactions, and predictions have been transformed by automation.	✓	✓			✓					
CI.L3B-04	Summarize how computation has revolutionized the way people build real and virtual organizations and infrastructures.	✓	✓			✓		✓			✓
CI.L3B-05	Identify laws and regulations that impact the development and use of software.								✓		✓
CI.L3B-06	Analyze the impact of government regulation on privacy and security.	✓							✓		✓
CI.L3B-07	Differentiate among open source, freeware, and proprietary software licenses and their applicability to different types of software.								✓		✓
CI.L3B-08	Relate issues of equity, access, and power to the distribution of computing resources in a global society.	✓						✓	✓		