Oklahoma Academic Standards for Computer Science {High School}

Concept	Subconcept	Level 1 - By the end of 10th Grade	Level 2 - By the end of 12th Grade
Computing Systems	Devices	L1.CS.D.01 Explain how abstractions hide the underlying implementation details of computing systems embedded in everyday objects.	
	Hardware & Software	L1.CS.HS.01 Explain the interactions between application software, system software, and hardware.	L2.CS.HS.01 Identify and categorize roles of an operating system.
	Troubleshooting	L1.CS.T.01 Develop and apply criteria for systematic discovery of errors and systematic strategies for correction of errors in computing systems.	L2.CS.T.01 Identify how hardware components facilitate logic, input, output, and storage in computing systems.
Networks & The Internet	Network Communication & Organization	L1.NI.NCO.01 Evaluate the scalability and reliability of networks by identifying and illustrating the basic components of computer networks (e.g., routers, switches, servers, etc.) and network protocols (e.g., IP, DNS, etc.).	L2.NI.NCO.01 Describe the issues that impact network functionality (e.g., bandwidth, load, latency, topology).
	Cybersecurity	L1.NI.C.01 Compare physical and cybersecurity measures by evaluating trade-offs between the usability and security of a computing system.	L2.NI.C.01 Compare and refine ways in which software developers protect devices and information from unauthorized access.
		L1.NI.C.02 Illustrate how sensitive data can be affected by attacks.	
		L1.NI.C.03 Recommend security measures to address various scenarios based on information security principles.	
		L1.NI.C.04 Explain trade-offs when selecting and implementing cybersecurity recommendations from multiple perspectives such as the user, enterprise, and government.	

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Data Analysis	Storage	L1.DA.S.01 Translate and compare different bit representations of data types, such as characters, numbers, and images.	
		L1.DA.S.02 Evaluate the trade-offs in how data is organized and stored digitally.	
	Collection, Visualization, & Transformation	L1.DA.CVT.01 Use tools and techniques to locate, collect, and create visualizations of small- and large-scale data sets (e.g., paper surveys and online data sets).	L2.DA.CVT.01 Use data analysis tools and techniques to identify patterns from complex real-world data.
			L2.DA.CVT.02 Generate data sets that use a variety of data collection tools and analysis techniques to support a claim and/or communicate information.
	Inference & Models	L1.DA.IM.01 Show the relationships between collected data elements using computational models.	L2.DA.IM.01 Use models and simulations to help formulate, refine, and test scientific hypotheses.
	Algorithms	L1.AP.A.01 Create a prototype that uses algorithms (e.g., searching, sorting, finding shortest distance) to provide a possible solution for a real-world problem.	L2.AP.A.01 Describe how artificial intelligence algorithms drive many software and physical systems (e.g., autonomous robots, computer vision, pattern recognition, text analysis).
			L2.AP.A.02 Develop an artificial intelligence algorithm to play a game against a human opponent or solve a real-world problem.
			L2.AP.A.03 Critically examine and trace classic algorithms (e.g., selection sort, insertion sort, binary search, linear search).

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Algorithms & Programming			L2.AP.A.04 Evaluate algorithms (e.g., sorting, searching) in terms of their efficiency and clarity.
	Variables	L1.AP.V.01 Demonstrate the use of lists (e.g., arrays) to simplify solutions, generalizing computational problems instead of repeatedly using primitive variables.	L2.AP.V.01 Compare and contrast simple data structures and their uses (e.g., lists, stacks, queues).
	Control	L1.AP.C.01 Justify the selection of specific control structures (e.g., sequence, conditionals, repetition, procedures) considering program efficiencies such as readability, performance, and memory usage.	L2.AP.C.01 Trace the execution of repetition (e.g., loops, recursion), illustrating output and changes in values of named variables.
	Modularity	L1.AP.M.01 Break down a solution into procedures using systematic analysis and design.	L2.AP.M.01 Construct solutions to problems using student-created components (e.g., procedures, modules, objects).
		L1.AP.M.02 Create computational artifacts by systematically organizing, manipulating and/or processing data.	L2.AP.M.02 Design or redesign a solution to a large-scale computational problem by identifying generalizable patterns.
			L2.AP.M.03 Create programming solutions by reusing existing code (e.g., libraries, Application Programming Interface (APIs), code repositories).
		L1.AP.PD.01 Create software by analyzing a problem and/or process, developing and documenting a solution, testing outcomes, and adapting the program for a variety of users.	L2.AP.PD.01 Create software that will provide solutions to a variety of users using the software life cycle process.
		L1.AP.PD.02 Define and classify a variety of software licensing schemes (e.g., open source, freeware, commercial) and discuss the advantages and disadvantages of each scheme in software development.	L2.AP.PD.02 Design software in a project team environment using integrated development environments (IDEs), versioning systems, and collaboration systems.

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	Program Development	L1.AP.PD.03 While working in a team, develop, test, and refine event-based programs that solve practical problems or allow self expression.	L2.AP.PD.03 Develop programs for multiple computing platforms.
		L1.AP.PD.04 Using visual aids and documentation, illustrate the design elements and data flow (e.g., flowcharts, pseudocode) of the development of a complex program.	L2.AP.PD.04 Systematically check code for correctness, usability, readability, efficiency, portability, and scalability through peer review.
		L1.AP.PD.05 Evaluate and refine computational artifacts to make them more user-friendly, efficient and/or accessible.	L2.AP.PD.05 Develop and use a series of test cases to verify that a program performs according to its design specifications.
			L2.AP.PD.06 Explain security issues that might lead to compromised computer programs.
			L2.AP.PD.07 Modify an existing program to add additional functionality and discuss intended and unintended implications (e.g., breaking other functionality).
of Computing	Culture	L1.IC.C.01 Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.	L2.IC.C.01 Evaluate the beneficial and harmful effects that computational artifacts and innovations have on society.
		L1.IC.C.02 Test and refine computational artifacts to reduce bias and equity deficits.	L2.IC.C.02 Evaluate the impact of equity, access, and influence on the distribution of computing resources in a global society.
		L1.IC.C.03 Demonstrate how a given algorithm applies to problems across disciplines.	L2.IC.C.03 Design and implement a study that evaluates or predicts how computation has revolutionized an aspect of our culture and how it might evolve (e.g., education, healthcare, art/entertainment, energy).
	Social Interactions	L1.IC.SI.01 Demonstrate how computing increases connectivity among people of various cultures.	

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Impacts of	Safety, Law, & Ethics	L1.IC.SLE.01 Explain the beneficial and harmful effects that intellectual property laws can have on innovation.	L2.IC.SLE.01 Debate laws and regulations that impact the development and use of software.
		L1.IC.SLE.02 Explain the privacy concerns related to the large-scale collection and analysis of information about individuals (e.g., how businesses, social media, and the government collects and uses data) that may not be evident to users.	
		L1.IC.SLE.03 Evaluate the social and economic consequences of how law and ethics interact with digital aspects of privacy, data, property, information, and identity.	