Alignment of Ohio Assessments for Educators (OAE) Computer Science Assessment Framework with Ohio-specified Standards

This alignment study identifies the national and/or Ohio educational standards that are addressed in whole or in part by each competency of the assessment framework. An indication of alignment does not necessarily imply complete congruence of the content of an OAE test competency with the relevant standard. The information in this document is subject to change if revisions are made to the assessment framework. Any changes will fully supersede the information contained in this document.

Competencies		Ohio Learning Standards	CSTA/ISTE
Computer Science		**Ohio Learning Standards: K-12 Computer Science**	**Standards for Computer Science Educators (Second Draft 11-06-2019)**
Algorithmic Thinking and Data Analysis			
0001	Understand problem solving and algorithm development.	Algorithms: ATP.A.K.a – ATP.A.12.a ATP.A.9-12.F.a ATP.A.9-12. F.b ATP.A.9-12.A.b Modularity ATP.M.1.a – ATP.M.8.a ATP.M.9–12.F.a ATP.M.9–12.A.a	1d. Develop programs and understand algorithms. Design, implement, and review programs in an iterative process using appropriate CS tools and technologies. Understand tradeoffs associated with different algorithms. 1f. Demonstrate CS practices. Apply and model CS and computational thinking practices in flexible and appropriate ways.
0002	Understand characteristics of algorithms.	Algorithms: ATP.A.K.a – ATP.A.12.a ATP.A.9-12.F.a ATP.A.9-12. F.b ATP.A.9-12.A.b ATP.A.9-12.A.c ATP.A.9-12.A.d Program Development	1d. Develop programs and understand algorithms. Design, implement, and review programs in an iterative process using appropriate CS tools and technologies. Understand tradeoffs associated with different algorithms. 1f. Demonstrate CS practices. Apply and model CS and computational thinking practices in flexible and appropriate ways.

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		ATP.PD.K.a – ATP.PD.8.a ATP.PD.1.b – ATP.PD.8.b ATP.PD.7.c – ATP.PD.8.c	
0003	Understand data analysis, modeling, and simulation.	Data Collection and Storage: DA.DCS.K.a – DA.DCS.8.a DA.DCS.K.b – DA.DCS.8.b DA.DCS.6.c – DA.DCS.8.c DA.DCS.9-12.F.a DA.DCS.9-12.F.b Visualization and Communication: DA.VC.K.a – DA.VC.8.a DA.VC.6.b – DA.VC.8.b DA.VC.9-12.F.a DA.VC.9-12.A.a Inference and Modeling: DA.IM.K.a – DA.IM.8.a DA.IM.9-12.F.a DA.IM.9-12.A.a	1c. Use and analyze data. Collect, store, transform, and analyze digital data to better understand the world and make more accurate predictions. 1f. Demonstrate CS practices. Apply and model CS and computational thinking practices in flexible and appropriate ways.

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Programming			
0004	Understand programming concepts and program design and development.	Program Development: ATP.PD.K.a – ATP.PD.8.a ATP.PD.9-12.F.a ATP.PD.9-12.F.b ATP.PF.9-12.F.c ATP.PD.9-12.A.a	1d. Develop programs and understand algorithms. Design, implement, and review programs in an iterative process using appropriate CS tools and technologies. Understand tradeoffs associated with different algorithms. 1f. Demonstrate CS practices. Apply and model CS and computational thinking practices in flexible and appropriate ways.
0005	Understand characteristics and uses of data types.	Variables and Data Representation: ATP.VDR.K.a – ATP.VDR.8.a ATP.VDR.6.b ATP.VDR.8.b– ATP.VDR.9-12.F.a ATP.VDR.9-12.A.a ATP.VDR.9-12.A.b	1d. Develop programs and understand algorithms. Design, implement, and review programs in an iterative process using appropriate CS tools and technologies. Understand tradeoffs associated with different algorithms. 1f. Demonstrate CS practices. Apply and model CS and computational thinking practices in flexible and appropriate ways.

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0006	Understand operators and control structures.	Control Structures: ATP.CS.K.a – ATP.CS.8.a ATP.CS.9-12.F.a ATP.CS.9-12.A.a ATP.CS.9-12.F.c ATP.VDR.9-12.A.a ATP.VDR.9-12.A.b	1d. Develop programs and understand algorithms. Design, implement, and review programs in an iterative process using appropriate CS tools and technologies. Understand tradeoffs associated with different algorithms. 1f. Demonstrate CS practices. Apply and model CS and computational thinking practices in flexible and appropriate ways.

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0007	Understand concepts of object-oriented design and programming.	Control Structures ATP.CS.9-12.F.b ATP.CS.9-12.A.a Modularity: ATP.M.1.a – ATP.M.8.a ATP.M.5.b ATP.M.9-12.F.a ATP.A.9-12.F.b ATP.M.9-12.F.b ATP.VDR.9-12.A.a ATP.VDR.9-12.A.b ATP.M.9-12.A.a ATP.CS.9-12.F.b ATP.M.9-12.A.b ATP.PD.9-12.A.a ATP.M.9-12.A.c ATP.CS.9-12.A.a	1d. Develop programs and understand algorithms. Design, implement, and review programs in an iterative process using appropriate CS tools and technologies. Understand tradeoffs associated with different algorithms. 1f. Demonstrate CS practices. Apply and model CS and computational thinking practices in flexible and appropriate ways.
<u>Computing Systems, Networks, and the Internet</u>			
0008	Understand terminology and concepts related to computing systems.	Devices: CS.D.K.a – CS.D.8.a	1a. Understand computing systems. Understand how hardware and software work within systems to input, process, store, and output information.

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		CS.D.9-12.F.a CS.D.9-12.F.b CS.D.9-12.F.c CS.D.9-12.A.a CS.D.9-12.A.b CS.D.9-12.A.c Hardware/Software: CS.HS.K.a – CS.HS.8.a CS.HS.9-12.F.a CS.HS.9-12.A.a Troubleshooting: CS.T.K.a – CS.T.8.a CS.T.9-12.F.a CS.T.9-12.F.b CS.T.9-12.A.a	
0009	Understand networks and the Internet.	Networking: NI.N.K.a – NI.N.8.a NI.N.1.b – NI.N.8.b NI.N.8.c NI.N.9-12.F.a NI.N.9-12.F.b	1b. Understand networks and the Internet. Understand how computing devices connect via networks and the Internet to facilitate communication and foster innovation.

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		NI.N.9-12.F.c NI.N.9-12.A.a NI.N.9-12.A.b NI.N.9-12.A.c Cyber Security: NI.C.K.a – NI.C.8.a NI.C.6.b – NI.C.8.b NI.C.6.c – NI.C.7.c NI.C.9-12.F.a NI.C.9-12.F.b NI.C.9-12.A.a NI.C.9-12.A.b	
Impacts of Computing and Learning Environments			

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0010	Understand social and global issues related to computer technology.	Culture: IC.Cu.K.a – IC.Cu.8.a IC.Cu.K.b – IC.Cu.8.b IC.Cu.6.c – IC.Cu.8.c IC.CU.7.d – IC.Cu.8.d IC.Cu.9-12.F.a IC.Cu.9-12.F.b IC.Cu.9-12.A.a IC.Cu.9-12.A.b IC.Cu.9-12.A.c	1e. Analyze impacts of computing. Analyze how people influence computing through their behaviors and cultural and social interactions, as well as how computing impacts society in both positive and negative ways. 2a. Understand issues of equity in Computer Science. Explain how structural barriers and social and psychological factors contribute to inequitable access, engagement, and achievement in Computer Science among marginalized groups. 2c. Represent diverse perspectives. Incorporate the perspectives and experiences of individuals from marginalized groups in curricular materials.

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		Social Interaction: IC.SI.K.a – IC.SI.8.a IC.SI.9-12.F.a IC.SI.9-12.F.b Safety, Law & Ethics: IC.SLE.K.a – IC.SLE.8.a IC.SLE.3.b – IC.SLE.8.b IC.SLE.3.c – IC.SLE.8.c IC.SLE.6.d – IC.SLE.8.d IC.SLE.6.e – IC.SLE.7.e IC.SLE.9-12.F.a IC.SLE.9-12.F.b IC.SLE.9-12.F.c IC.SLE.9-12.F.d IC.SLE.9-12.A.a IC.SLE.9-12.A.b	5e. Encourage student communication about computing. Create meaningful opportunities for students to discuss, read, and write about computing.
0011	Understand effective learning environments.	Safety, Law & Ethics: IC.SLE.K.a – IC.SLE.8.a IC.SLE.3.b – IC.SLE.8.b IC.SLE.3.c – IC.SLE.8.c IC.SLE.6.d – IC.SLE.8.d	1e. Analyze impacts of computing. Analyze how people influence computing through their behaviors and cultural and social interactions, as well as how

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		IC.SLE.6.e – IC.SLE.7.e IC.SLE.9-12.F.a IC.SLE.9-12.F.b IC.SLE.9-12.F.c IC.SLE.9-12.F.d IC.SLE.9-12.A.a IC.SLE.9-12.A.b	computing impacts society in both positive and negative ways. 2a. Understand issues of equity in Computer Science. Explain how structural barriers and social and psychological factors contribute to inequitable access, engagement, and achievement in Computer Science among marginalized groups. 2b. Minimize threats to inclusion. Develop strategies to proactively challenge unconscious bias and minimize stereotype threat in CS. 2c. Represent diverse perspectives. Incorporate the perspectives and experiences of individuals from marginalized groups in curricular materials. 2d. Use data for decision-making to improve equity. Create and implement a plan to improve access, engagement, and full participation in CS using classroom data to inform decision-making. 2e. Promote accessible educational CS materials. Learn to effectively evaluate tools and curricula[j] and to leverage resources[j] to improve accessibility for all students. 3e. Leverage community resources. Identify and connect resources in the local community and broader Computer Science ecosystem to support student learning in Computer Science.

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			3c. Identify and counteract personal bias. Reflect on how their own perspective, privilege, and power impact student success and classroom culture and continuously work to counteract these personal biases. 3d. Recognize the value of CS for all students. Refine a personal teaching philosophy reflecting that all students can and should learn CS. 4a. Analyze computer science curricula. Analyze computer science curricula for implementation in their classrooms in terms of CS standards alignment, accuracy, completeness of content, cultural relevance, instructional approaches, and accessibility. 4b. Develop standards-aligned learning experiences. Design and adapt learning experiences with strong alignment to comprehensive K-12 computer science standards. 4c. Design inclusive learning experiences. Ensure that all students can access and engage with content and succeed in learning CS by using Universal Design for Learning (UDL)[and Culturally Relevant Pedagogy (CRP) . 4d. Develop strong student conceptual understanding. Use a toolkit of CS-specific teaching strategies to develop students' strong conceptual

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			understanding and to proactively address student misconceptions in CS. 4e. Integrate personally meaningful projects. Plan opportunities for students to create open-ended and personally meaningful projects. 4f. Inform instruction through assessment. Develop multiple forms of formative and summative assessment to provide feedback and support. Use resulting data for instructional decision-making and differentiation. 4g. Build connections between CS and other disciplines. Design learning experiences that highlight connections to other disciplines and real-world contexts. 5a. Facilitate inquiry for student learning. Use inquiry-based learning to enhance student understanding of CS content. 5b. Cultivate a supportive classroom environment. Cultivate a supportive classroom environment that values and amplifies multiple solutions, approaches, perspectives, and voices. 5c. Promote student self-efficacy. Facilitate students' engagement in the learning process and encourage students to take leadership of their own learning by encouraging creativity and use of a variety of resources and problem-solving techniques.

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			5d. Support student collaboration with computing. Provide meaningful opportunities for students to work together. Elicit students' ability to provide, receive, and respond to constructive feedback. 5e. Encourage student communication about computing. Create meaningful opportunities[l] for students to discuss, read, and write about computing. 5f. Provide meaningful feedback. Use formative assessments to provide effective feedback to students and to adjust instruction in order to promote stronger achievement in CS.