Kansas Licensure Standards for Computer Science Educators
(Draft May 4, 2021)

"Learner" is defined as students, including those with disabilities or exceptionalities, who are gifted, and students who represent diversity based on ethnicity, race, socioeconomic status, gender, language, religion, and geographic origin.

Note: These standards draw on the [Kansas Computer Science PK-12 Model Standards](), [K12 Computer Science Framework](), [CSTA Standards for CS Teachers](), and [ISTE Standards for Educators]().

Standard 1: Computer Science Knowledge and Skills; Candidates demonstrate and continuously develop thorough knowledge of Computer Science (CS) content. They demonstrate proficiency with CS concepts, and they integrate these concepts with CS practices, including computational thinking. They also understand the progression of content though grade bands. [(CSTA 1)]()

Function 1: Knowledge and application of computational thinking practices in flexible and appropriate ways. [(CSTA 1a)]()

Content Knowledge
1.1.1 CK Candidates know CS practices, including fostering an inclusive computing culture, collaborating around computing, communicating about computing, and CS unplugged. ([K12CSP - CP 1, 2, 7]())
1.1.2 CK Candidates know computational thinking practices, including recognizing and defining computational problems, developing and using abstractions, creating computational artifacts, and testing and refining computational artifacts. ([K12CSF - CP 3, 4, 5, 6]())

Professional Skills
1.1.3 PS Candidates apply CS and computational thinking practices in flexible and appropriate ways and reflect it in their planning and instruction. ([K12CSF - CP 1-7]())

Function 2: Knowledge and application of computing systems to analyze interactions, design projects, and troubleshoot problems ([CSTA 1b](); [K12CSF CC 1]())

Content Knowledge
1.2.1 CK Candidates can describe the major milestones in history that led to modern computer hardware, software, networking, and integrated technologies

and identify the historical and current contributions of individuals and the significance of their contributions.

1.2.2 CK Candidates identify and describe how hardware and software function to input, process, store, and output information within computing systems. (K12CSF CC1b)

Professional Skills

1.2.3 PS Candidates demonstrate how to use a variety of computing devices and how they can be connected to other devices to extend their capabilities. (K12CSF CC1a)

1.2.4 PS Candidates demonstrate appropriate hardware and software techniques within computing systems by analyzing interactions, designing projects, and troubleshooting problems. (K12CSF CC1c)

Function 3: Model how computing devices connect via networks and the Internet to facilitate communication and explain tradeoffs between usability and security. (CSTA 1c; K12CSF CC 2)

Content Knowledge

1.3.1 CK Candidates understand how networks connect computing devices to share information and resources, and how networks provide greater connectivity in the computer world by providing fast, secure communication and facilitation. (K12CSF CC1a)

1.3.2 CK Candidates know network and communication terminology and how they relate to creating and configuring networks. (K12CSF CC1a)

1.3.4 CK Candidates know the origin and history of the Internet and fundamental technologies/processes (e.g., HTTP, HTML, browsers, servers, clients) that allow it to function.

1.3.5 CK Candidates understand core cybersecurity concepts, best practices, and vocabulary including privacy issues, managing digital identity, sensitive data, integrity, authenticity, and authentication. (ISTE-E 3b)

1.3.6 CK Candidates understand the interplay, including benefits and tradeoffs, of physical and digital security.

Professional Skills

1.3.7 PS Candidates model how computing devices connect via networks and the Internet to facilitate communication and explain tradeoffs between usability and security. (K12CSF CC1a, CC1b)

1.3.8 PS Candidates model and promote management of sensitive data, digital identity, and protect student data privacy. (K12CSF CC1b; ISTE-E 3d)

Function 4: Collect, store, transform, and analyze digital data to better understand the world and make accurate predictions using data. (CSTA 1d; K12CSF CC3)

Content Knowledge
1.4.1 CK Candidates identify and understand various kinds of data, how it is collected, and the effects of collecting data with computation and automated tools. (K12CSF CC4a)
1.4.2 CK Candidates know and evaluate various data storage and data retrieval methods, including the tradeoffs associated with those methods. (K12CSF CC4b)
1.4.3 CK Candidates know various methods and techniques to visualize and transform data. (K12CSF CC4c)
1.4.4 CK Candidates know how to use data models and simulations to make predictions and inferences. (K12CSF CC4d)
1.4.5 CK Candidates are familiar with core concepts in information literacy. (ISTE-E 3b)

Professional Skills
1.4.6 PS Candidates collect, store, transform, and analyze digital data to better understand the world and make more accurate predictions. (CSTA1d; K12CSF CC4)
1.4.7 PS Candidates can critically evaluate the veracity of digital information from various sources (including social networks, community edited websites, and digital communication) based on the information source, quality, and content. (ISTE-E 3b)

Function 5: Knowledge and use of CS tools and technologies to develop programs and interpret algorithms (CSTA 1e; K12CSF CC 4)

Content Knowledge
1.5.1 CK Candidates can design, develop, combine, and decompose algorithms, as well as evaluate competing algorithms. (K12CSF CC5a)
1.5.2 CK Candidates know how computer programs store and manipulate data using variables. (K12CSF CC5b)
1.5.3 CK Candidates know how to use and create simple to complex control structures to specify the order in which instructions are executed within an algorithm or program. (K12CSF CC5c)
1.5.4 CK Candidates understand modularity and decomposition including recognizing patterns to make use of general, reusable solutions for commonly

occurring scenarios and clearly describing tasks in ways that are widely usable. (K12CSF CC5d)

1.5.5 CK Candidates know how and why people develop programs, including evaluating the tradeoffs in program design associated with complex decisions involving user constraints, efficiency, ethics, and testing. (K12CSF CC5e)

Professional Skills

1.5.6 PS Candidates create programs to organize different types of data, creating large collections of data with structures of increasing complexity. (K12CSF CC5b)

1.5.7 PS Candidates design, model, implement, debug, and review programs in an iterative process using appropriate CS tools and technologies. (CSTA 1e)

1.5.8 PS Candidates interpret multiple algorithms and explain associated tradeoffs. (CSTA 1e)

Function 6: Impacts of Computing (CSTA 1d; K12CSF CC 5)

Content Knowledge

1.6.1 CK Candidates understand the interplay between computing and culture, including belief systems, language, relationships, technology, and institutions. (K12CSF CC 5a)

1.6.2 CK Candidates understand how computing affects institutions and careers through innovative ways of connecting people, communicating information, and expressing ideas.(K12CSF CC 5b)

1.6.3 CK Candidates understand how legal and ethical considerations of computing influence behaviors that can affect the safety and security of individuals. (K12CSF CC 5c)

Professional Skills

1.6.4 PS Candidates analyze how behaviors, cultural norms, and social interactions influence computing, as well as the positive and negative ways computing impact society. (CSTA 1d)

1.6.5 PS Candidates model how to positively contribute to and responsibly participate in the digital world, mentoring students in safe, legal, and ethical practices with digital tools and the protection of intellectual rights and property. (ISTE-E 3)

Standard 2: Diversity, Equity, and Inclusion; Candidates proactively advocate for diversity, equity, and inclusion in the CS classroom. They work towards an intentional, equity-focused vision to improve access, engagement, and achievement for all of their students in CS. (CSTA 2)

Function 1: Examine issues of equity in CS (CSTA 2a)

Content Knowledge
2.1.1 CK Candidates know how systemic barriers and social and psychological factors contribute to inequitable access, engagement, and achievement in CS among marginalized groups. (CSTA 2a)
2.1.2 CK Candidates know about open source CS tools and how low-cost/no-cost programming tools can be used to provide access to computer science tools regardless of financial resources.
2.1.3 CK Candidates understand how to use data, such as self efficacy and attitude surveys, in decision making to improve access, engagement, enrollment, and full participation in improving equity and diversity in CS. (CSTA 2d)

Professional Skills
2.1.4 PS Candidates reflect and develop a preliminary plan on ways to improve access, engagement, and full participation in CS in their own CS teaching context.

Function 2: Minimize threats to inclusion (CSTA 2b)

Content Knowledge
2.2.1 CK Candidates identify how threats to inclusion such as unconscious bias, microaggressions, and stereotyping negatively impact diversity and inclusion in the field of CS / CS environment. (ISTE-E 3a)

Professional Skills
2.2.2 PS Candidates develop purposeful strategies to proactively challenge unconscious bias, microaggressions, and minimize stereotype threat in CS.

Function 3: Represent diverse perspectives (CSTA 2c)

Content Knowledge
2.3.1 CK Candidates understand the importance of having culturally responsive learning experiences in CS that encourage learners to understand, question, and analyze ideas from diverse perspectives.

<u>Professional Skills</u>
2.3.2 PS Candidates evaluate and incorporate culturally responsive and diverse perspectives and experiences of individuals from marginalized groups in CS curricular materials and instruction.

Function 4: Use accessible instructional materials (CSTA 2e)

<u>Content Knowledge</u>
2.4.1 CK Candidates understand how to provide multiple means of student engagement, instructional representations, actions and expressions of learning to best meet the needs of all learners (Universal Design for Learning, UDL).
2.4.2 CK Candidates know a variety of appropriate differentiation strategies and accommodations for successful student learning in CS.

<u>Professional Skills</u>
2.4.3 PS Candidates evaluate and select CS instructional tools and curricula which best leverage UDL principles to ensure accessibility, inclusion, and equity for all learners.

Standard 3: Professional Growth and Identity; Candidates continuously develop their knowledge, practice, and professional identity to keep pace with the rapidly evolving discipline. They participate in the larger CS education community and collaborate with others to develop the skills that enable all students to succeed in their classes. (CSTA 3)

Function 1: Pursue targeted professional development (CSTA 3a)

<u>Content Knowledge</u>
3.1.1 CK Candidates understand how to create a professional learning and development plan that includes appropriate goals, objectives, and outcomes.

<u>Professional Skills</u>
3.1.2 PS Candidates create, implement, and reflect on a professional learning and development plan to continuously deepen their CS content and pedagogical knowledge and skills.

Function 2: Model continuous learning (CSTA 3b)

Content Knowledge
3.2.1 CK Candidates know various problem-solving strategies and sequential steps to solve CS related problems.
3.2.2 CK Candidates know how to stay informed on new digital resources. (ISTE-E 2c)

Professional Skills
3.2.3 PS Candidates model willingness to learn from others and to continuously develop new skills. (ISTE-E 1b)
3.2.4 PS Candidates demonstrate perseverance when encountering new or challenging content.
3.2.5 PS Candidates model for colleagues the identification, exploration, evaluation, curation and adoption of new digital resources and tools for learning. (ISTE-E 2c)

Function 3: Examine and counteract personal bias (CSTA 3c)

Content Knowledge
3.3.1 CK Candidates are knowledgeable of research relating to biases, individual power and privilege, and the potential impact they have to influence students' CS identities and trajectories.

Professional Skills
3.3.2 PS Candidates examine and reflect on how their personal perspective, privilege, and power impact student success and classroom culture, and continuously work to counteract biases.

Function 4: Commit to the mission of CS for all students (CSTA 3d)

Content Knowledge
3.4.1 CK Candidates have knowledge of CS pedagogy emphasizing the importance of CS for all students.
3.4.2 CK Candidates understand how CS is applicable to students across the disciplines.
Professional Skills
3.4.3 PS Candidates develop a personal teaching philosophy reflecting that all students can and should learn CS.

Function 5: Leverage community resources (CSTA 3e)

Content Knowledge
3.5.1 CK The candidate understands the importance of community resources and how to evaluate materials to support student learning in CS.

Professional Skills
3.5.2 PS Candidates identify and connect resources in the local community and broader CS ecosystem to support student learning in CS.

Function 6: Participate in CS professional learning communities (CSTA 3f)

Content Knowledge
3.6.1 CK Candidates have knowledge of local and global CS education communities and how to evaluate professional learning communities which support their professional growth.

Professional Skills
3.6.2 PS Candidates create and actively participate in CS professional learning communities and various local and global learning networks to collaborate with peers, celebrate successes, share lessons learned, and address challenges. (ISTE-E 1b)

Standard 4: Instructional Design; Candidates design learning experiences that engage students in problem solving and creative expression through CS, using pedagogical content knowledge (PCK). They plan to meet the varied learning, cultural, linguistic, and motivational needs of individual students in order to build student self-efficacy and capacity in CS. (CSTA 4)

Function 1: Analyze CS curricula (CSTA 4a)

Content Knowledge
4.1.1 CK Candidates know CS curricula for implementation in their classrooms in terms of CS standards alignment, accuracy, completeness of content, cultural relevance, and accessibility.

Professional Skills
4.1.2 PS Candidates analyze curricula to supplement and adapt curricular materials to fill content gaps (accuracy, CS standards alignment, completeness of content), differentiate instruction, and establish relevancy and accessibility.

Function 2: Develop Standards-aligned learning experiences (CSTA 4b)

Content Knowledge

4.2.1 CK Candidates know the Kansas P-12 Computer Science Model Standards and the supporting professional computer science standards (K-12 Computer Science Framework, Computer Science Teachers of America (CSTA) Standards, and International Society for Technology in Education (ISTE) Standards).

Professional Skills

4.2.2 PS Candidates design and adapt learning experiences that align to Kansas P-12 Computer Science Model Standards.

Function 3: Design inclusive learning experiences (CSTA 4c)

Content Knowledge

4.3.1 CK Candidates understand how to provide multiple means of student engagement, instructional representations, actions, and expressions of learning to best meet the needs of ALL students. (Universal Design for Learning, UDL)
4.3.2 CK Candidates understand Culturally Relevant Pedagogy (CRP), and other techniques appropriate to CS, to support all students in successfully accessing and engaging with content.

Professional Skills

4.3.3 PS Candidates use Universal Design for Learning (UDL), Culturally Relevant Pedagogy (CRP), and other techniques appropriate to CS, to support all students in successfully accessing and engaging with content.

Function 4: Build connections between CS and other disciplines (CSTA 4d)

Content Knowledge

4.4.1 CK Candidates understand computing as a cross-cutting concept and how computing has enabled innovation in other disciplines.
4.4.2 CK Candidates are familiar with the engineering design process and how CS teaching can utilize these principles for incorporating multiple disciplines into a real-word CS solution to a problem.

Professional Skills

4.4.3 PS Candidates design learning experiences that make connections to and draw upon knowledge from multiple disciplines to solve authentic real-world problems.

Function 5: Plan projects that have personal meaning to students (CSTA 4e)

Content Knowledge
4.5.1 CK Candidates understand elements of high quality project-based learning within CS.

Professional Skills
4.5.2 PS Candidates plan opportunities for students to create and share open-ended and personally meaningful projects.
4.5.3 PS Candidates incorporate various evidence-based project-based learning characteristics and design thinking into student centered projects.
4.5.4 PS Candidates are able to evaluate artifacts produced from a project-based learning environment.

Function 6: Plan instruction to foster student understanding (CSTA 4f)

Content Knowledge
4.6.1 CK Candidates can describe several misconceptions and other difficulties held by students in CS concepts, practices, and perspectives.

Professional Skills
4.6.2 PS Candidates plan activities that use evidence-based CS teaching strategies to develop students' conceptual understanding while proactively addressing students' misconceptions about CS.

Function 7: Inform instruction through assessment (CSTA 4g)

Content Knowledge
4.7.1 CK Candidates understand various formative and summative assessment practices and techniques.
4.7.2 CK Candidates understand the principles of an assessment plan and how it fosters feedback throughout the learning cycle.

Professional Skills
4.7.3 PS Candidates develop an assessment plan composed of multiple forms and modalities of assessment to provide feedback and support.
4.7.4 PS Candidates use assessment data for reflection, instructional decision-making, and differentiation.

Standard 5: Classroom Practice; Candidates are responsive classroom practitioners who implement evidence-based pedagogy to facilitate meaningful experiences and produce empowered learners of CS. (CSTA 5)

Function 1: Use inquiry to facilitate student learning (CSTA 5a)

Content Knowledge
5.1.1 CK Candidates understand the major concepts and processes of inquiry-based and authentic learning environments (ISTE-E 4a, 5b).
5.1.2 CK Candidates are knowledgeable of 21st-century skills including digital literacy and media fluency.

Professional Skills
5.1.3 PS Candidates develop inquiry-based, authentic learning experiences to enhance student understanding of CS content. (ISTE-E 5b)
5.1.4 PS Candidates establish a learning culture that promotes curiosity and critical examination of online resources and fosters digital literacy and media fluency. (ISTE-E 3b)

Function 2: Cultivate a positive classroom climate (CSTA 5b)

Content Knowledge
5.2.1 CK Candidates identify key elements of positive classroom climate, including inclusiveness, diversity, and varied perspectives.
5.2.2 CK Candidates demonstrate an understanding of empathy, digital citizenship, and appropriate online behavior (ISTE-E 3a).

Professional Skills
5.2.3 PS Candidates cultivate a positive classroom climate that values and amplifies varied perspectives, abilities, approaches, and solutions.
5.2.4 PS Candidates create experiences for learners to make positive, socially responsible contributions in digital and real world contexts.
5.2.5 PS Candidates design learning opportunities for learners to model empathetic behavior online that build relationships and community.

Function 3: Promote student self-efficacy (CSTA 5c)

Content Knowledge

5.3.1 CK Candidates understand the relationships between self-efficacy, motivation, and engagement.

5.3.2 CK Candidates know how to design learning experiences using strategies that build learner self-direction and ownership of learning.

Professional Skills

5.3.3 PS Candidates promote student self-efficacy by facilitating student creativity, choice in product and process, and self-directed learning.

5.3.4 PS Candidates use technology to create, adapt, and personalize learning experiences that foster independent learning and accommodate learner differences and needs. (ISTE-E 5a)

5.4.5 Candidates foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings. (ISTE-E 6a)

Function 4: Support student collaboration (CSTA 5d)

Content Knowledge

5.4.1 CK Candidates are knowledgeable of a variety of collaborative tools which provide students the opportunity to collaborate with experts, teams, and other students, in both local and global settings. (ISTE-E 4c)

5.4.2 CK Candidates understand the importance of cultural competency and awareness in student collaboration. (ISTE-E 4d, KCSMS L1.IC.C.01)

Professional Skills

5.4.3 PS Candidates provide structured opportunities for student collaboration in CS to develop students' ability to provide, receive, and respond to constructive feedback in the design, implementation, and review of computational artifacts. (CSTA 5d)

5.4.4 PS Candidates collaborate with students to discover and use emerging digital resources. (ISTE-E 4b, 4d)

Function 5: Encourage student communication (CSTA 5e)

Content Knowledge

5.5.1 CK Candidates understand varied modes of communication and how they are used for learning and expressing multiple perspectives.

5.5.2 CK Candidates are knowledgeable of discussion, reading, and writing strategies which encourage and facilitate student communication.

Professional Skills
5.5.3 PS Candidates engage and facilitate learners through varied modes of communication, including face-to-face, virtual, synchronous, and asynchronous settings. (KSCSMS 5.IC.SI.02)
5.5.4 PS Candidates create meaningful opportunities for students to communicate about integrating CS concepts and practices.

Function 6: Guide students' use of feedback (CSTA 5f)

Content Knowledge
5.6.1 CK Candidates understand the role of feedback in learner achievement and can supply meaningful feedback in a variety of communication modes. (CSTA 5f)
5.6.2 CK Candidates know how and when to engage learners in the process of reflection and self-assessment.

Professional Skills
5.6.3 PS Candidates use formative assessments to provide timely, specific, and actionable feedback to students and to adjust instruction. (CSTA 5f)
5.6.4 PS Candidates encourage students' ability to seek, interpret, and use feedback from computers, teachers, peers, and community. (CSTA 5f, (KCSMS L1.AP.M.02)
5.6.5 PS Candidates promote student use of the systematic design and development of programs for broad audiences by incorporating feedback. (KSDE Computer Science Model Standard L1.AP.M.02)