

International Society for Technology In Education (ISTE)
Computer Science Educator Standards 2012
Pending Approval – October 2012

STANDARD 1: CONTENT KNOWLEDGE (DATA REPRESENTATION AND ABSTRACTION)

Effective teachers of secondary computer science understand and demonstrate knowledge of major computing concepts including primitive data types, data structures, and abstract data types. Pre-service teacher candidates:

- 1.1. Effectively use primitive data types.
- 1.2. Demonstrate an understanding of static and dynamic data structures.
- 1.3. Effectively use, manipulate, and explain various data stores, various types (text, images, sound, etc.), various locations (local, server, cloud), etc.
- 1.4. Effectively use modeling and simulation to solve real-world problems.

STANDARD 2: CONTENT KNOWLEDGE (ALGORITHMS)

Effective teachers of secondary computer science effectively design, develop, and test algorithms. Pre-service teacher candidates:

- 2.1. Using a modern high-level programming language, construct correctly-functioning programs involving simple and structured data types; compound Boolean expressions; and sequential, conditional, and iterative control structures.
- 2.2. Design and test algorithms and programming solutions to problems in different contexts (textual, numeric, graphic, etc.) using advanced data structures.
- 2.3. Analyze algorithms by considering complexity, efficiency, aesthetics, and correctness.
- 2.4. Demonstrate knowledge of two or more programming paradigms.
- 2.5. Effectively use two or more development environments.
- 2.6. Demonstrate knowledge of varied software development models and project management strategies.

STANDARD 3: CONTENT KNOWLEDGE (COMPUTER ORGANIZATION)

Effective teachers of secondary computer science demonstrate knowledge of digital devices, systems, and networks. Pre-service teacher candidates:

- 3.1. Demonstrate an understanding of data representation at the machine level.
- 3.2. Demonstrate an understanding of machine-level components and related issues of complexity.
- 3.3. Demonstrate an understanding of operating systems and networking in a structured computer system.
- 3.4. Demonstrate an understanding of the operation of computer networks and mobile computing devices.

STANDARD 4: CONTENT KNOWLEDGE (COMPUTING IN THE CONTEMPORARY World)

Effective teachers of secondary computer science demonstrate an understanding of the role computer science plays and its impact in the modern world. Pre-service teacher candidates:

- 4.1. Demonstrate an understanding of the social, ethical, and legal issues and impacts of computing and attendant responsibilities of computer scientists and users.
- 4.2. Analyze the contributions of computer science to current and future innovations in sciences, humanities, the arts, and commerce.

STANDARD 5: CONTENT PEDAGOGY

Effective teachers of secondary computer science plan and teach computer science lessons/units using effective and engaging practices and methodologies. Pre-service teacher candidates:

- 5.1. Select a variety of real-world computing problems and project-based methodologies that support active and authentic learning and provide opportunities for creative and innovative thinking and problem solving.
- 5.2. Demonstrate the use of a variety of collaborative groupings in lesson plans/units and assessments
- 5.3. Design activities that require students to effectively describe computing artifacts and communicate results using multiple forms of media.
- 5.4. Develop lessons and methods that engage and empower learners from diverse cultural and linguistic backgrounds.
- 5.5. Identify problematic concepts and constructs in computer science and appropriate strategies to address them.
- 5.6. Design and implement developmentally appropriate learning opportunities supporting the diverse needs of all learners.
- 5.7. Create and implement multiple forms of assessment resulting in data to capture student learning, provide remediation, and shape classroom instruction.

STANDARD 6: EFFECTIVE LEARNING ENVIRONMENTS

Effective teachers of secondary computer science design environments that promote effective teaching and learning in computer science classrooms and online learning environments and promote digital citizenship. Pre-service teacher candidates:

- 6.1. Promote and model the safe and effective use of computer hardware, software, peripherals, and networks.
- 6.2. Plan for equitable and accessible classroom, lab, and online environments that support effective and engaging learning.

STANDARD 7: EFFECTIVE PROFESSIONAL KNOWLEDGE AND SKILLS

Effective teachers of secondary computer science participate in, promote, and model ongoing professional development and lifelong learning relative to computer science and computer science education. Pre-service teacher candidates:

- 7.1. Identify and participate in professional computer science and computer science education societies, organizations, and groups that provide professional growth opportunities and resources.
- 7.2. Demonstrate knowledge of evolving social and research issues relating to computer science and computer science education.
- 7.3. Identify local, state, and national content and professional standards and requirements affecting the teaching of secondary computer science.