Proposed 2024 Computer Science *Standards of Learning*

VIRGINIA DEPARTMENT OF EDUCATION

Relevant Legislation

Standards of Quality, Section 22.1-253.13:1-B.

"The Board of Education shall establish a regular schedule, in a manner it deems appropriate, for the review, and revision as may be necessary of the Standards of Learning in all subject areas. Such review of each subject area **shall occur at least once every seven years.** Nothing in this section shall be construed to prohibit the Board from conducting such review and revision on a more frequent basis."

Computer Science SOL Revision Process Timeline Details

March 2023	BOE Approves SOL Timeline and Public Comment Period -2017 Computer Science *Standards of Learning*
May 2023	Public Engagement Roundtable Sessions
June 2023	Computer Science Education Advisory Board (CSEAB) Meeting K-12 SOL Review Committee Convened
July - August 2023	VDOE and K-12 Committee Review and Revise Draft Computer Science *Standards of Learning*
September 2023 – January 2024	Educator Engagement Sessions for Feedback Computer Science Education Advisory Board (CSEAB) Meeting
August – March 2024	Computer Science Education Advisory Board (CSEAB) Meeting: Guidance and Revisions on 2017 *Standards of Learning* and Proposed DRAFT Standards
December 2023 – March 2024	VDOE Prepares Draft 2024 Computer Science *Standards of Learning* and Summary of Changes for First Review by the Board of Education (BOE)
April 2024	BOE First Review of Draft 2024 Computer Science *Standards of Learning*
April – May 2024 (tentative)	Public Feedback Period – Draft 2024 Computer Science *Standards of Learning*
June 2024 (tentative)	BOE Final Review of Draft 2024 Computer Science *Standards of Learning*

Computer Science Education Advisory Board (CSEAB)

Representative of parents, educators, institutions of higher education, non-profit organizations, and industry.

Role of Committee

- Analyze Stakeholder Feedback
- Review Draft 2024 Computer Science SOL
- Provide Recommendations

Meetings

- June 12, 2023
- September 7, 2023
- October 5, 2023
- October 18, 2023
- November 30, 2023
- March 6, 2024

2024 Computer Science *Standards of Learning* Revision – Rigor & Depth

1. Improve **Vertical Coherence** through grade levels and courses.
2. Comprehensive approach to the inclusion of additional concepts and skills within **Data Analysis, Cybersecurity, Computing Systems content standards** to increase practical knowledge and support for postsecondary workforce expectations.
3. Inclusion of **emerging technologies** that address AI and machine learning as well as flexibility to address upcoming technologies.
4. Elevation of **Computational Thinking** (Abstraction, Decomposition, Pattern Recognition, and Algorithm Design).
5. Reinforce resilience, creativity, and continued learning through the application of the **iterative design process.**
6. Created a **distinct difference** in level of **advancement** between Computer Science Foundations and Computer Science Principles.

K-12 Computer Science Courses in Virginia

Computer Science *Standards of Learning* - Grade Levels and Courses

Elementary School Grade Levels	Middle School Grade Levels	Computer Science Middle School Course	High School Computer Science Courses (NCTE)
• Kindergarten • Grade 1 • Grade 2 • Grade 3 • Grade 4 • Grade 5	• Grade 6 • Grade 7 • Grade 8	• Middle School Elective CS Course *(9-week, 18-week and 36- week course options)*	• Computer Science Foundations • Computer Science Principles • Computer Science Programming

IMPROVED SPECIFICITY OF STANDARDS FROM 2017 TO 2024

2024 Standards consistently include knowledge and skills within the standard document as shown in the comparison documents.

2017 *Standards of Learning* Essential Knowledge and Skills (EKS) **Cybersecurity**	**2024 *Standards of Learning*** Knowledge and Skills (KS) **Cybersecurity (CYB)**
5.9 The student will evaluate and solve problems that relate to inappropriate use of computing devices and networks.	**5.CYB.1 The student will identify ways to limit unauthorized access on computing devices.** a. Define virus, malware, and phishing. b. Explain how viruses and malware can put personal information at risk. c. Explain the role of human interactions in social engineering attacks. d. Identify ways to protect personal and private information when using a computing device and the Internet. e. State the importance of doing updates on software.

Draft 2024 Computer Science SOL

Progression of Computational Thinking from Early Elementary to Middle School

Grade 4:
The student will apply computational thinking to identify patterns and design algorithms to compare and contrast multiple algorithms used for the same task.

Grade 5 - 6:
The student will apply computational thinking to identify patterns, make use of decomposition to break down problems or processes into sub-components, and design algorithms.

Grade 7 - 8:
The student will apply computational thinking to design programs to accomplish a task as a means of creative expression or scientific exploration.

MSCSE-9.AP.1:
The student will apply computational thinking to evaluate and solve a problem.

MSCSE-36.AP.2:
The student will decompose problems and subcomponents into parts to facilitate the design, implementation, and review of programs.

Draft 2024 Computer Science SOL

Refinement and Coherence on Secondary Courses

Computer Science Foundations

CSF.CYB.3 The student will compare various security measures, considering tradeoffs between the usability and security of a computing system.

Computer Science Principles

CSP.CYB.1 The student will evaluate security technologies, techniques, and practices in terms of confidentiality, integrity, and availability.

Computer Science Programming (NCTE)

PRG.CYB.2 The student will write or adapt a program to avoid common vulnerabilities.

Inclusion of Artificial Intelligence

Three Approaches: Guided by the *AI4K12 Guidelines: Five Concepts in Artificial Intelligence*

Foundational computer science concepts and skills within proposed DRAFT 2024 Computer Science *Standards of Learning* that provide students with an understanding of fundamental principles and concepts that are essential for understanding artificial intelligence

Delineation of AI grade-band concepts and skills across multiple grade levels for a scaffolded approach to the inclusion of artificial intelligence concepts and skills in the DRAFT 2024 Computer Science *Standards of Learning.*

Direct inclusion of concepts and skills found within the A14K12 guidelines are incorporated into the DRAFT 2024 Computer Science *Standards of Learning.*

Draft 2024 Computer Science SOL

Inclusion of Data Bias & Training Data (Data Analysis & Machine learning)

Grade 3 - Data and Analysis
(3.DA.2d) Describe how training data can be labeled when using a machine learning tool.

Grade 4 - Computing Systems
(4.CSY.3b) Discuss the role of training data used for machine learning.

(4.CSY.3c) Evaluate how training data is used to make classification predictions.

Computer Science Foundations - Data and Analysis
(CSF.DA.3) The student will explain the use of training data in machine learning.

Computer Science Principles- Data and Analysis
(CSP.DA.2) The student will collect and use training data.

Computer Science Principles – Data and Analysis
(CSP.DA.3)The student will use a supervised or unsupervised learning algorithm to train a model on real world data.

Data Bias is addressed:

- 8.DA.2a
- MSCSE-18.CSY.1b
- MSCSE-36.CSY.1
- CSP.DA.1e
- PRG.DA.3

Draft 2024 Computer Science SOL

Next Steps: Public Hearing Dates and Locations

In Person Hearings
6:30 – 8:00 PM

- Monday, May 6, 2024
  - Chesapeake, VA
- Wednesday, May 08, 2024
  - Abingdon, VA
- Monday, May 13, 2024
  - Charlottesville, VA
- Monday, May 20, 2024
  - Fairfax, VA

Virtual Public Hearings

- Wednesday, May 1, 2024
  - 11:30 AM-1:00 PM
- Wednesday, May 9, 2024
  - 11:30 AM-1:00 PM
- Wednesday, May 15, 2024
  - 6:30 -8:00 PM

VDOE

Computer Science

Contact Information

Keisha Tennessee

K-12 Computer Science Coordinator

Keisha.Tennessee@doe.Virginia.gov

Computer Science Program

VDOE.ComputerScience@doe.Virginia.gov