

Seventh Grade: Computer Science

In Seventh Grade, students delve into the complexities of physical and digital security measures, critically evaluating threats and vulnerabilities associated with Internet use. They hone their programming skills through continued construction of algorithms, sequences, loops, and functions. Students leverage computational thinking and programming skills while applying an iterative design process to create programs as a means of creative expression and innovation. Through the use of purposeful computing devices students will collect data and define patterns, make inferences, and continue to develop computational models. Through the application of computational thinking, students will resolve hardware and software issues methodically. Students will deepen their understanding of concepts like machine learning, broadening their understanding of advanced technologies and their applications. Students will examine and evaluate the impact of computing technologies within society and globally. Additionally, students will identify individual strengths that can be used within computer science careers.

Algorithms and Programming (AP)

- 7.AP.1 The student will apply computational thinking to design programs to accomplish a task as a means of creative expression or scientific exploration.**
- a. Identify patterns and repeated steps in an algorithm, problem, or process.
 - b. Decompose an algorithm, problem, or process into sub-components.
 - c. Abstract relevant information to identify essential details.
 - d. Contrast various algorithms to solve reasoning problems when accomplishing a task.
- 7.AP.2 The student will plan and implement algorithms that include sequencing, loops, variables, user input, conditional control structures, and functions using a block-based or text-based programming tool.**
- a. Describe the concept of functions for use in a computer program.
 - b. Plan an algorithm using plain language, pseudocode, or diagrams.
 - c. Read and write programs that collect and use numeric and text data from users.
 - d. Read and write programs that contain nested conditionals and nested loops.
- 7.AP.3 The student will use the iterative design process to create, test, and debug programs using a block-based or text-based programming language.**
- a. Create and test programs that contain multiple control structures.
 - b. Trace and predict outcomes of programs.
 - c. Analyze the outcomes of programs to identify logic and syntax errors.
 - d. Analyze and describe the results of a program to assess validity of outcomes.
 - e. Revise and improve an algorithm to resolve errors or produce desired outcomes.

7.AP.4 The student will apply proper attribution when incorporating other sources into original work.

- a. Apply proper methods of attribution when using work from the Internet and other sources.
- b. Incorporate information or assets from the Internet into a program with proper attribution.

Computing Systems (CSY)

7.CSY.1 The student will design projects that use computing devices to collect and exchange data.

- a. Apply project management skills to distribute tasks and maintain project timeline.
- b. Generate ideas combining hardware and software components that can be used to collect and exchange data.
- c. Describe how hardware and software can be used together to collect and exchange data.
- d. Evaluate the usability of hardware and software to collect and exchange data.
- e. Select the hardware and software components for project designs by considering factors such as functionality, cost, size, speed, accessibility, and aesthetics.

7.CSY.2 The student will apply computational thinking to troubleshoot and document hardware and software-related problems.

- a. Apply systematic processes to resolve hardware, software, and connectivity-related problems.
- b. Compile and record successful methods used to resolve problems for common hardware, software, and connectivity-related problems.

Cybersecurity (CYB)

7.CYB.1 The student will differentiate physical and digital security measures that protect electronic information.

- a. Compare and contrast physical and digital security measures.
- b. Research and synthesize the tradeoffs between usability and security.
- c. Identify common threats and vulnerabilities associated with Internet use and Internet-based systems.
- d. Identify potential solutions to address common threats and vulnerabilities.

Data and Analysis (DA)

7.DA.1 The student will utilize computational tools to visualize and evaluate data to draw conclusions and make predictions.

- a. Develop computational models that simulate real-world phenomena, considering relevant variables and relationships.
- b. Refine and modify computational models based on observed data and feedback, ensuring alignment with empirical evidence.
- c. Analyze patterns and trends within observed data, comparing them with the predictions made by computational models.
- d. Evaluate the effectiveness and accuracy of computational models in capturing and explaining the observed data.

7.DA.2 The student will explain the process and application of computational thinking in machine learning.

- a. Explain how supervised, unsupervised, and/or reinforcement learning methods utilize decomposition, pattern recognition, abstraction, and algorithms to learn from and make decisions.
- b. Explore neural networks and its role in machine learning and artificial intelligence.

Impacts of Computing (IC)

7.IC.1 The student will assess the national and global impact of computing technologies.

- a. Discuss specific examples of how computing technologies have influenced various national and global industries and sectors.
- b. Analyze the implications of emerging technologies and potential real-world impact nationally and globally.
- c. Evaluate the environmental impact of computing technologies nationally and globally.

7.IC.2 The student will describe and explain the impact of screen time on interactions with others.

- a. Describe the positive and negative impact of social media on socialization.
- b. Research the type of data collected on social media and online platforms that monitor social interactions.
- c. Describe and explain the evolution of screen time and the impact it has had on social interactions.
- d. Create a social media usage plan that demonstrates safe practices, meaningful use, and a balanced approach.

7.IC.3 The student will identify individual preferences, skillset, and experiences and determine how these relate to a chosen computer science career field.

- a. Use a career interest assessment to identify and categorize preferences, skillsets, and experiences.
- b. Evaluate and connect personal skillsets, interests, talents, and values to a computer science career.

7.IC.4 The student will identify and apply strategies to prevent personal and public works from being pirated and plagiarized.

- a. Discuss and describe intellectual property protections.
- b. Research and list safeguards used to prevent intellectual property infringement.

7.IC.5 The student will evaluate the effect of Artificial Intelligence (AI) in various professions.

- a. Research AI integration in various professions and evaluate its impact on the job market and society.
- b. Examine and analyze the impact on job creation and changes in employment needs based on the use of AI.
- c. Evaluate and explain the benefits and drawbacks of the implementation of AI technologies in various professions.

Networks and the Internet (NI)

7.NI.1 The student will describe and explain why protocols are essential in data transmission.

- a. Define packet, router, and protocol.
- b. Describe the process of sending a file through a network.
- c. Explain the role of Internet Protocol (IP) addresses in transmitting information.
- d. Explain how packets ensure reliable communication among computing devices.
- e. Model how data is transmitted over networks and the Internet.