

# 9th Grade American Online School

## COMPUTER SCIENCE CURRICULUM

### Creating, Organizing, and Understanding the Digital World Through Code, Data, and Critical Thinking

Version Apr/2025

## 1. Introduction

### The Role of Computer Science Education in 9th Grade

The 9th Grade Computer Science curriculum introduces students to the fundamental principles of computational thinking, digital literacy, and creative problem-solving with code. Students build technical fluency in programming, web development, and data structures, while developing an ethical understanding of media, privacy, and technology's role in society. Through hands-on exploration, students will create original digital projects and prepare for advanced studies in technology and digital innovation.

By the end of this course, students will:

- ✓ Understand core computing systems including hardware, software, and cybersecurity.
- ✓ Develop foundational programming skills using languages such as Python or JavaScript.
- ✓ Analyze the credibility of digital media and evaluate ethical uses of technology.
- ✓ Build creative and functional web-based and coded projects.
- ✓ Collaborate and communicate effectively in digital development environments.

## 2. Core Competence Areas

### CS.1 Digital Literacy and Critical Media Analysis

#### Learning Outcomes

By the end of this course, students will be able to:

- ✓ Evaluate the credibility and bias of online content.
- ✓ Understand how algorithms influence digital media exposure.
- ✓ Demonstrate ethical and responsible online behavior.

#### Competencies

##### CS.1.A.1 – Evaluating Digital Content.

- Distinguish credible sources from misinformation using fact-checking tools and source analysis.

##### CS.1.A.2 – Understanding Algorithmic Influence.

- Analyze how platforms recommend content and shape user experience.

##### CS.1.A.3 – Practicing Digital Responsibility.

- Model appropriate, safe, and respectful digital interactions and behaviors.

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### CS.2 Computer Systems and Technology Fundamentals

#### Learning Outcomes

By the end of this unit, students will be able to:

- ✓ Describe the basic architecture and function of computer systems.
- ✓ Explain data storage, transmission, and protection.
- ✓ Apply basic cybersecurity practices to protect digital information.

## Competencies

### CS.2.A.1 – Understanding Computer Components.

- Identify the roles of hardware (CPU, RAM, storage) and software (OS, applications).

### CS.2.A.2 – Explaining Data Representation.

- Understand how binary systems, file formats, and compression are used to store and transmit information.

### CS.2.A.3 – Practicing Cybersecurity.

- Describe encryption, strong passwords, and safe data handling practices.
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## CS.3 Programming Fundamentals

### Learning Outcomes

By the end of this unit, students will be able to:

- ✓ Write and debug simple programs using loops, conditionals, and functions.
- ✓ Use programming to solve real-world problems and create interactive content.
- ✓ Understand how to organize and reuse code using functions and parameters.

## Competencies

### CS.3.A.1 – Writing Basic Programs.

- Create programs that utilize variables, loops, conditionals, and user input.

### CS.3.A.2 – Debugging Code.

- Identify and fix logical and syntactical errors in code.

### CS.3.A.3 – Using Functions.

- Define and call reusable functions to improve code efficiency.

### CS.3.A.4 – Creating Console-Based Applications.

- Build simple interactive applications such as text-based games and quizzes.
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## CS.4 Algorithms and Problem Solving

### Learning Outcomes

By the end of this unit, students will be able to:

- ✓ **Design logical, step-by-step solutions to programming problems.**
- ✓ **Represent algorithms using flowcharts or pseudocode.**
- ✓ **Implement algorithms in working code.**

### Competencies

#### CS.4.A.1 – Designing Algorithms.

- Develop and document algorithms to guide program behavior.

#### CS.4.A.2 – Implementing Algorithms.

- Translate algorithmic logic into functioning code.

#### CS.4.A.3 – Applying Computational Thinking.

- Break down problems, identify patterns, and build reusable solutions.

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## CS.5 Data Structures and Organization

### Learning Outcomes

By the end of this unit, students will be able to:

- ✓ **Store and manage data using arrays, lists, and dictionaries.**
- ✓ **Work with real-world data sets in digital projects.**
- ✓ **Perform simple file input and output operations.**

## Competencies

### CS.5.A.1 – Using Data Structures.

- Create and manipulate structured data using lists and key-value pairs.

### CS.5.A.2 – Applying Real-World Data.

- Use data such as locations, prices, or demographics in programs.

### CS.5.A.3 – Reading Files.

- Open and read data from .txt or .csv files using code.
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## CS.6 Web Development and Creative Coding

### Learning Outcomes

By the end of this unit, students will be able to:

- ✓ Create web pages using HTML and CSS.
- ✓ Add interactivity with JavaScript.
- ✓ Apply principles of accessibility and design to websites.

## Competencies

### CS.6.A.1 – Structuring Web Content.

- Build functional web pages using HTML tags and formatting.

### CS.6.A.2 – Styling Web Pages.

- Use CSS to style and layout page elements.

### CS.6.A.3 – Adding Interactivity.

- Implement simple JavaScript functions for user interaction.

### CS.6.A.4 – Designing Accessible Interfaces.

- Apply user-centered design and accessibility standards.
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## **CS.7 Ethics, Privacy, and Technology in Society**

### **Learning Outcomes**

By the end of this unit, students will be able to:

- ✓ **Explain ethical and societal implications of digital technologies.**
- ✓ **Discuss privacy issues and data collection practices.**
- ✓ **Reflect on the role of AI and automation in future societies.**

### **Competencies**

#### **CS.7.A.1 – Understanding Data Ethics.**

- Describe data surveillance, targeted advertising, and digital rights.

#### **CS.7.A.2 – Analyzing Technology’s Social Impact.**

- Explore topics such as automation, algorithmic bias, and tech inequality.

#### **CS.7.A.3 – Evaluating AI and Emerging Tech.**

- Discuss the promise and challenges of artificial intelligence and robotics.

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## **3. Assessment and Evaluation**

### **Formative Assessments – Checking Progress Through Interactive Learning**

- ✓ **Daily coding exercises and media analysis discussions.**
- ✓ **Flowcharts, pseudocode, and idea logs for planning.**
- ✓ **Peer feedback on early-stage programming.**

### **Summative Assessments – Final Projects and Exams**

- ✓ **Cumulative unit tests on programming, systems, and ethics.**
- ✓ **Completed website and interactive coding projects.**
- ✓ **Analytical tasks on digital media and data ethics.**

## **Authentic Assessment – Real-World Applications**

- ✓ Final capstone project with documentation and public presentation.
  - ✓ Ethical debate or tech impact reflection.
  - ✓ Peer-reviewed digital portfolios and group collaboration reports.
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## **4. Instructional Strategies for Online Learning**

### **Inquiry-Based and Thematic Learning**

- ✓ Analyze real-world challenges such as fake news detection or geolocation apps.
- ✓ Investigate ethical dilemmas and computing innovations.

### **Project-Based Learning (PBL)**

- ✓ Develop digital products solving practical problems.
- ✓ Use design thinking and agile development cycles.

### **Technology-Integrated Learning**

- ✓ Utilize online IDEs (Replit, VS Code), design platforms (Figma, Canva), and browser-based tools.
- ✓ Implement coding journals, debugging logs, and AI-based assistants.