

Introduction to Computer Science (2025)

Careers and Professionalism

A Standard 1.1 - Demonstrate professional readiness within the computer science domain. I.A

- 1.1.1 Demonstrate understanding of various career paths in computer science (e.g., software development, data science, cybersecurity, networking, robotics, computer engineering, and artificial intelligence) and their roles in different industries. **I.A.1**
- 1.1.2 Practice professional communication skills through various activities (e.g., mock interviews, technical presentations, and collaborative coding projects) to prepare for real-world scenarios in computer science careers. **I.A.2**
- 1.1.3 Describe the importance of ethical considerations in computer science (e.g., data privacy, algorithmic bias, and social impact of technology) and how they apply to professional practice. **I.A.3**
- 1.1.4 Evaluate the concept and importance of a professional online presence in computer science careers (e.g., portfolio websites, professional networking platforms, open-source contributions) and explore ways to showcase skills and projects. **I.A.4**
- 1.1.5 Identify key elements of a professional portfolio and explain the purpose of a portfolio (e.g., showcasing skills, documenting growth, and supporting college applications or job searches). **I.A.5**

Computational Thinking

A Standard 2.1 - Apply computational thinking to effectively solve real-world problems. II.A

- 2.1.1 Recognize situations where leveraging computational approaches (e.g., data analysis, automation, or simulations) would be beneficial for solving real-world problems. **II.A.1**
- 2.1.2 Apply the core computational thinking principles—abstraction, decomposition, algorithm development, and pattern recognition—to designing effective problem-solving strategies. **II.A.2**

B Standard 2.2 - Access, manipulate, and store data within a program using a text-based programming language. II.B

- 1 2.2.1 Use various data types (e.g., Booleans, characters, integers, floating points, and strings) appropriately within a program. II.B.1
- 2 2.2.2 Create and use variables to store and manage data within a program. II.B.2
- 3 2.2.3 Construct expressions using arithmetic operators (e.g., +, -, *, /, and %) and numeric data types to perform calculations within a program. II.B.3
- 4 2.2.4 Convert between different data types when necessary within a program (e.g., casting a string into an integer). II.B.4
- 5 2.2.5 Perform operations that encode and decode data from one form into another form (e.g., binary to hexadecimal, numeric values to colored pixels, or numbers to ASCII/Unicode representations). II.B.5
- 6 2.2.6 Implement data structures (e.g., arrays, lists, sets, and maps) to organize, store, manipulate, and perform operations on collections of data within a program. II.B.6

C Standard 2.3 - Design and create programs by understanding the execution sequence and anticipated outputs using a text-based programming language. II.C

- 1 2.3.1 Analyze a program in terms of steps of execution and expected outcomes (e.g., storyboards, flowcharts, and pseudocode). II.C.1
- 2 2.3.2 Construct Boolean expressions using relational operators (e.g., <, >, <=, >=, ==, and !=) within a program. II.C.2
- 3 2.3.3 Construct Boolean expressions using logical operators (e.g., AND, OR, and NOT) within a program. II.C.3
- 4 2.3.4 Create programs that implement selection control structures (e.g., if statements and switch statements) to make decisions and execute different code paths based on conditions. II.C.4
- 5 2.3.5 Create programs that implement iteration control structures (e.g., while loops and for loops) to repeat code blocks a specific number of times or until a condition is met. II.C.5
- 6 2.3.6 Create subroutines (e.g., procedures and functions) to modularize code for reusability and organization within a program. II.C.6
- 7 2.3.7 Debug errors (e.g., syntax, runtime, and logic) within a program to ensure program functionality. II.C.7

D Standard 2.4 - Transfer data into and out of a program effectively using a text-based programming language. II.D

- 1 2.4.1 Use the console for basic data input and output operations within a program. II.D.1
- 2 2.4.2 Explain the structure and purpose of different file types (e.g., txt, csv, bmp, and json) used for data storage. II.D.2
- 3 2.4.3 Develop programs that perform file operations including reading data from, writing data to, and appending data to files. II.D.3

E Standard 2.5 - Develop programs that adhere to good coding conventions and include clear documentation. II.E

- 1 2.5.1 Implement consistent formatting and naming conventions (e.g., indentation, spacing, variable names) to improve code readability and maintainability. II.E.1
- 2 2.5.2 Craft clear and concise comments within the code to explain the purpose of different code sections, algorithms used, and non-obvious logic. II.E.2

Data Analysis and Visualization

A Standard 3.1 - Investigate different types of data and explore various methods for collecting data. III.A

- 1 3.1.1 Categorize data into different types (e.g., quantitative vs. qualitative) and understand the distinction between them. III.A.1
- 2 3.1.2 Identify potential sources of data (e.g., sensors, surveys, databases, and web scraping) based on the type of data needed. III.A.2
- 3 3.1.3 Explain advantages and disadvantages of different data collection methods considering accuracy, cost, and time. III.A.3
- 4 3.1.4 Design basic data collection methods (e.g., surveys, checklists, experiments) for a specific purpose. III.A.4

B Standard 3.2 - Develop programs that effectively communicate data insights using analysis and visualizations. III.B

- 1 3.2.1 Identify and address data quality issues (e.g., missing values, inconsistencies, and outliers). III.B.1
- 2 3.2.2 Analyze data sets using descriptive statistics and visualizations (e.g., histograms and box plots). III.B.2
- 3 3.2.3 Inspect and use exploratory analysis techniques to identify patterns and relationships. III.B.3
- 4 3.2.4 Develop programs that perform appropriate data analysis techniques (e.g., correlations, comparing means). III.B.4
- 5 3.2.5 Create programs that generate visualizations (e.g., bar, line, scatter, pie charts). III.B.5

C Standard 3.3 - Communicate data insights effectively, considering data bias and ethics. III.C

- 1 3.3.1 Recognize and explain how potential biases in data can influence insights. III.C.1
 - 2 3.3.2 Develop narratives that communicate data insights clearly and effectively. III.C.2
 - 3 3.3.3 Demonstrate understanding of correlation vs. causation. III.C.3
 - 4 3.3.4 Develop sound inferences to support informed decision-making. III.C.4
 - 5 3.3.5 Present positive and negative findings in an unbiased way. III.C.5
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Major and Emerging Technologies

A Standard 4.1 - Develop understanding of major established technologies and their impact. IV.A

- 1 4.1.1 Define artificial intelligence (AI), its subfields, benefits, and drawbacks. IV.A.1
 - 2 4.1.2 Explain cloud computing, its service models, and its impact on IT. IV.A.2
 - 3 4.1.3 Define the Internet of Things (IoT), its applications, and its impact. IV.A.3
 - 4 4.1.4 Explain big data, its characteristics, and its impact on industry. IV.A.4
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B Standard 4.2 - Investigate emerging technologies and their potential impact. IV.B

- 1 4.2.1 Define quantum computing and explain its potential to transform computing. IV.B.1
 - 2 4.2.2 Describe edge computing and its advantages in processing data. IV.B.2
 - 3 4.2.3 Explain extended reality (VR, AR, MR) and its applications. IV.B.3
 - 4 4.2.4 Describe blockchain technology and its potential uses in various sectors. IV.B.4
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Cybersecurity, Computer Systems, and Networking

A Standard 5.1 - Understand the importance of cybersecurity and its role in protecting information. V.A

- 1 5.1.1 Analyze core information security principles (confidentiality, integrity, availability, authentication, non-repudiation). V.A.1
- 2 5.1.2 Describe common cyber threats (e.g., malware, phishing, ransomware). V.A.2
- 3 5.1.3 Describe cybersecurity practices and technologies (e.g., encryption, firewalls, MFA). V.A.3
- 4 5.1.4 Analyze the impact of best practices (e.g., strong passwords, awareness training). V.A.4

B Standard 5.2 - Identify and explain core components of computer systems. V.B

- 1 5.2.1 Identify and explain key hardware components and their purposes. V.B.1
- 2 5.2.2 Define software and distinguish between system and application software. V.B.2
- 3 5.2.3 Explain basic operating system functions and their importance. V.B.3
- 4 5.2.4 Summarize open-source software and its impact. V.B.4
- 5 5.2.5 Explain the importance of software updates and patches. V.B.5

C Standard 5.3 - Identify and explain core concepts of computer networks. V.C

- 1 5.3.1 Define and explain common network concepts (e.g., IP, protocols, latency). V.C.1
- 2 5.3.2 Identify and describe functionalities of common network hardware. V.C.2
- 3 5.3.3 Explain basic network security principles used to safeguard networks. V.C.3
- 4 5.3.4 Analyze the relationship between computer systems, software, and networks. V.C.4