Missouri Computer Science

By the End of the 10th Grade

Computing Systems

Devices

1 Explain how abstractions hide the underlying implementation details of computing systems embedded in everyday objects. 9-10.CS.D.01

Hardware & Software

1 Explain the abstraction and interactions between application software, system software and hardware. 9-10.CS.HS.01

Troubleshooting

1 Develop, communicate and apply systematic troubleshooting strategies for correction of errors in computing systems. 9-10.CS.T.01

Networks & the Internet

Network Communication & Organization

1 Evaluate the scalability and reliability of networks by identifying and illustrating the basic components of computer networks (e.g., routers, switches, servers) and network protocols (e.g., IP, DNS). 9-10.NI.NCO.01

2 Describe the issues that impact network functionality (e.g., bandwidth, load, delay, topology). 9-10.NI.NCO.02

Cybersecurity

1 Compare physical and cybersecurity measures by evaluating trade-offs between the usability and security of a computing system. 9-10.NI.C.01

2 Illustrate how sensitive data can be affected by attacks. 9-10.NI.C.02

3 Recommend security measures to address various scenarios based on information security principles. 9-10.NI.C.03

4 Explain trade-offs when selecting and implementing cybersecurity recommendations from multiple perspectives such as the user, enterprise and government. 9-10.NI.C.04

Data & Analysis

Storage

1 Translate and compare different bit representations of data types, such as characters, numbers and images. 9-10.DA.S.01

2 Evaluate the trade-offs in how data is organized and stored digitally. 9-10.DA.S.02

Collection, Visualization & Transformation

1. Create data visualizations to help others better understand real-world phenomena. 9-10.DA.CVT.01
2. Explain the insights and knowledge gained from digitally processed data by using appropriate visualizations, notions and precise language. 9-10.DA.CVT.02
3. Evaluate and refine computational artifacts to make them more usable and accessible. 9-10.DA.CVT.03

Inference & Models

1. Show the relationships between collected data elements using computational models. 9-10.DA.IM.01
2. Refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process. 9-10.DA.IM.02

Algorithms & Programming

Algorithms

1. Create a prototype that uses algorithms (e.g., searching, sorting, finding shortest distance) to provide a possible solution for a real-world problem. 9-10.AP.A.01

Variables

1. Create problem solutions that utilize primitive variables (e.g., strings, ints, Booleans, doubles). 9-10.AP.V.01
2. Demonstrate the use of advanced variables (e.g., lists, arrays, objects) to simplify solutions, generalizing computational problems instead of repeatedly using primitive variables. 9-10.AP.V.02

Control

1. Apply the concepts of specific control structures (e.g., sequence, conditionals, repetition, procedures) considering program efficiencies such as readability, performance and memory usage. 9-10.AP.C.01

Modularity

1. Break down a solution into procedures using systematic analysis and design utilizing functional abstraction. 9-10.AP.M.01
2. Create computational artifacts (file, graphic, video, audio) by systematically organizing, manipulating and/or processing data. 9-10.AP.M.02

Program Development

1. Using visual aids and documentation, illustrate the design elements and data flow (e.g., flowcharts, pseudocode) of the development of a program. 9-10.AP.PD.01
2. Create a program by analyzing a problem and/or process, developing and documenting a solution, testing outcomes, debugging errors and adapting the program for a variety of users. 9-10.AP.PD.02
3. While collaborating in a team, develop, test and refine programs that solve practical problems or allow self- expression. 9-10.AP.PD.03
4. Evaluate and refine computational artifacts to make them more user-friendly, efficient and/or accessible. 9-10.AP.PD.04

Impacts of Computing

Culture

1. Evaluate the ways computing impacts personal, ethical, social, economic and cultural practices. 9-10.IC.C.01
2. Test and refine computational artifacts to reduce bias and equity deficits. 9-10.IC.C.02
3. Demonstrate how a given algorithm applies to problems across disciplines. 9-10.IC.C.03

Social Interactions

1. Demonstrate through collaboration on a project how computing increases connectivity among people of various cultures. 9-10.IC.SI.01
2. Explain how the degrees of communication afforded by computing have impacted the nature and content of career fields. 9-10.IC.SI.02

Safety, Law & Ethics

1. Explain the beneficial and harmful effects that intellectual property laws can have on innovation. 9-10.IC.SLE.01
2. Explain the privacy concerns related to the collection and analysis of information about individuals that may not be evident to users. 9-10.IC.SLE.02
3. Evaluate the social and economic consequences of how law and ethics interact with digital aspects of privacy, data, property, information and identity. 9-10.IC.SLE.03
4. Define and classify a variety of software licensing schemes (e.g., open source, freeware, commercial) and discuss the advantages and disadvantages of each scheme in software development. 9-10.IC.SLE.04
5. Identify and explain the potential impacts and implications of emerging technologies on larger social economic and political structures with evidence from credible sources. 9-10.IC.SLE.05