Maryland Computer Science

# By the end of 10th Grade

## Computing Systems CS

### D. Devices D

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

### HS. Hardware & Software HS

1 Explain and compare levels of abstraction between application software, system software, and hardware layers. 10.CS.HS.01

### T. Troubleshooting T

1 Develop and evaluate guidelines and criteria that convey systematic troubleshooting strategies that can be used to identify/fix errors. 10.CS.T.01

## Networks and the Internet NI

### NCO. Network Communication & Organization NCO

1 Evaluate the scalability and reliability of networks by identifying and describing the relationship between routers, switches, servers, topology, and addresses. 10.NI.NCO.01

2 Describe the issues that impact network functionality (e.g. Bandwidth, load, delay, topology, TCP/IP and OSI Models). 10.NI.NCO.02

### C. Cybersecurity C

1 Illustrate how sensitive data and critical infrastructure can be affected by malware and other attacks and recommend security measures to address various scenarios based on factors such as efficiency, feasibility, and ethical impacts 10.NI.C.01

2 Explain tradeoffs when selecting and implementing cybersecurity recommendations from multiple perspectives such as the user, enterprise, and government. 10.NI.C.02

3 Understand and identify the relationship between Confidentiality, Integrity, Availability (CIA) Triad and the security measures that address the balance between them as it pertains to data. 10.NI.C.03

4 Identify ethical concerns about individual privacy, intellectual property, entering systems without permission, and destroying data and demonstrate the ability to exercise proper judgement and best practices in a variety of different scenarios. 10.NI.C.04

5 Recognize and prevent social engineering attacks. Differentiate between legitimate and fraudulent information. 10.NI.C.05

## Data Analysis DA

### S. Storage S

1 Translate, compare, and evaluate different bit representations of realworld phenomena (large data sets), such as characters, numbers, and images and how they are organized and stored. 10.DA.S.01

### CVT. Collection, Visualization & Transformation CVT

1 Use software tools to develop interactive data representations that help others to better understand real-world phenomena 10.DA.CVT.01

Not addressed at this level

### IM. Inference & Models IM

1 Design computational models that identify and represent the relationships among different elements of data collected from a phenomenon or process 10.DA.IM.01

## Algorithms and Programming AP

### Algorithms

1 Develop prototypes that use algorithms (e.g., sequencing, selection, iteration, recursion, etc.) to solve computational problems by leveraging prior student knowledge and personal interest. 10.AP.A.01

2 Design and implement an algorithm to play a game against a human opponent or solve a problem. 10.AP.A.0

Not addressed at this level

Not addressed at this level

Not addressed at this level

### V. Variables V

1 Identify common features in multiple lines of code and substitute a single segment that uses lists (arrays) to account for differences. 10.AP.V.01

2 Utilize lists to simplify solutions, generalizing computational problems, instead of repeatedly utilizing simple variables. 10.AP.V.02

### C. Control C

1 Justify and explain the rationale behind the selection of specific control structures when tradeoffs involve implementation, readability, and program performance. 10.AP.C.01

2 Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue by using events to initiate instructions. 10.AP.C.02

### M. Modularity M

1 Systematically analyze problems, using top down design, in order to break them down into smaller components, using procedures, modules, and/or objects to implement abstractions. 10.AP.M.01

2 Create computational artifacts by using common structures to organize, manipulate, and process data 10.AP.M.02

Not addressed at this level

### PD. Program Development PD

1 Systematically design and implement programs for broad audiences, solicit user feedback, and refine programs based on user feedback. 10.AP.PD.01

2 Identify and evaluate licenses that limit or restrict use of computational artifacts and consider implications on original work, especially when incorporating libraries and other resources. 10.AP.PD.02

3 Evaluate and refine computational artifacts to improve usability, accessibility, and efficiency. 10.AP.PD.03

4 Design and develop computational artifacts while working collaboratively. 10.AP.PD.04

5 Represent the design elements and data flow (e.g., flowcharts, pseudocode, etc.) of the development of a complex program through the use of various visual aids and documentation techniques. 10.AP.PD.0

Not addressed at this level

Not addressed at this level

Not addressed at this level

## Impacts of Computing IC

### C. Culture and Diversity C

1 Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices. 10.IC.C.01

2 Evaluate and refine computational artifacts to reduce bias and equity deficits 10.IC.C.02

3 Demonstrate and explain how an existing algorithm/computational innovation applies to problems across disciplines. 10.IC.C.03

4 Demonstrate and explain how an existing algorithm/computational innovation applies to problems in society. 10.IC.C.0

### SI. Social Interactions SI

1 Demonstrate and explain how various methods of collaboration can increase diverse ideas and solutions. 10.IC.SI.01

## SLE. Safety, Law & Ethics SLE

1. Explain the positive and negative consequences that intellectual property laws can have on innovation. 10.IC.SLE.01
2. Explain the privacy concerns related to the collection, generation, and analysis of large-scaled data that may not be evident to users. 10.IC.SLE.02
3. Evaluate the social and economic implications of privacy in the context of safety, law, and ethics. 10.IC.SLE.03