Ohio's Learning Standards

Computer Science

Grade 9-12 Foundational Level

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Grades 9-12—Foundational Level Standards

COMPUTING SYSTEMS

Devices
CS.D.9-12.F.a Identify different multifunctional computing devices and connection technologies, both virtual and physical, to describe their purpose.

CS.D.9-12.F.b Develop and apply criteria to evaluate computing systems for a given purpose and existing limitations.

CS.D.9-12.F.c Create an artifact to demonstrate the roles and interactions of computing systems embedded in everyday objects.

CS.D.9-12.F.d Evaluate alternative computing architectures for emerging technologies, including cluster and quantum computing.

Hardware and Software
CS.HS.9-12.F.a Compare and contrast interactions between application software, system software and hardware.

Troubleshooting
CS.T.9-12.F.a Apply a systemic process to identify problems and take steps to correct them within an integrated computing system.

CS.T.9-12.F.b Analyze an IT device to determine either what repairs are needed or how to build it.

NETWORKS AND THE INTERNET

Networking
NI.N.9-12.F.a Evaluate and select networking devices to establish scalable communications.

NI.N.9-12.F.b Evaluate and select networking protocols for classical, clustered and quantum computing to establish network communication.

NI.N.9-12.F.c Understand scalability and reliability of networks to describe the relationships and effects of how the different types of networks work together.

Cybersecurity
NI.C.9-12.F.a Examine and employ principles of cybersecurity.

NI.C.9-12.F.b Identify physical, social and digital security risks to address possible attacks from both existing and emergent technologies, including cluster computing and quantum key distribution.

NI.C.9-12.F.c Compare and contrast examples of various threat actors, such as nation-states, cyber terrorist groups, organized crime or hacktivists.

NI.C.9-12.F.d Explore and utilize examples of encryption methods, e.g., Vigenere, Bacon's cipher, and Enigma.

Internet of Things (IoT)
NI.IOT.9-12.F.a Design an IoT life cycle scenario that encompasses data gathering, transmission, reception and data analysis to demonstrate how the IoT operates and apply these skills to design products that model the process.

NI.IOT.9-12.F.b Explore and plan career pathways related to IoT to identify careers associated with the computer science field.

DATA AND ANALYSIS

Data Collection and Storage
DA.DCS.9-12.F.a Analyze patterns in a real-world data store through hypothesis, testing and use of data tools to gain insight and knowledge.

DA.DCS.9-12.F.b Investigate data storage systems to compare and contrast how data is stored and accessed.

Visualization and Communication
DA.VC.9-12.F.a Analyze the benefits and limitations of data visualization or multisensory artifacts and tools to communicate which is most appropriate to solve a real-world problem.

Inference and Modeling
DA.IM.9-12.F.a Evaluate a model by creating a hypothesis, testing it and refining it to discover connections and trends in the data.

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ALGORITHMIC THINKING AND PROGRAMMING

Algorithms

ATP.A.9-12.F.a Define and use appropriate problem solving strategies and visual artifacts to create and refine a solution to a real-world problem.

ATP.A.9-12.F.b Define and implement an algorithm by decomposing problem requirements from a problem statement to solve a problem.

ATP.A.9-12.F.c Define and explain iterative algorithms to understand how and when to apply them.

ATP.A.9-12.F.d Define and explain recursive algorithms to understand how and when to apply them.

Variables and Data Representation

ATP.VDR.9-12.F.a Identify types of variables and data and utilize them to create a computer program that stores data in appropriate ways.

Control Structures

ATP.CS.9-12.F.a Define control structures and Boolean logic and use them to solve real-world scenarios.

ATP.CS.9-12.F.b Use appropriate syntax to create and use a method.

ATP.CS.9-12.F.c Use data scoping to isolate data.

Modularity

ATP.M.9-12.F.a Break down a solution into procedures using systematic analysis and design.

Equivalent to: ATP.A.9-12.F.b Define and implement an algorithm by decomposing problem requirements from a problem statement to solve a problem.

ATP.M.9-12.F.b Create computational artifacts by systematically organizing, manipulating and/or processing data.

Addressed in:

ATP.VDR.9-12.A.a Utilize different data storage structures to store larger and more complex data than variables can contain.

ATP.VDR.9-12.A.b Identify the appropriate data structures or variables to use to design a solution to a complex problem.

Program Development

ATP.PD.9-12.F.a Investigate software development methodologies to select the appropriate one for a project to complete as a team.

ATP.PD.9-12.F.b Compare test methodologies to evaluate why each is used and to determine their benefits and costs.

ATP.PD.9-12.F.c Correctly use consistent naming conventions, version control and comments to demonstrate why these are important for future use, maintenance and reuse of code.

ARTIFICIAL INTELLIGENCE

Perception

AI.P.9-12.F.a Explain how radar, lidar, GPS and accelerometer data are represented.

AI.P.9-12.F.b Describe the limitations and advantages of various types of computer sensors.

Representation & Reasoning

AI.RR.9-12.F.a Categorize real-world problems as classification, prediction, sequential decision problems, combination search, heuristic search, adversarial search, logical deduction or statistical inference.

AI.RR.9-12.F.b For each of these types of reasoning problems (classification, prediction, sequential decision-making, combinatorial search, heuristic search, adversarial search, logical deduction and statistical inference), list an algorithm that could be used to solve that problem.

AI.RR.9-12.F.c Describe the differences between types of search algorithms.

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Machine Learning

AI.ML.9-12.F.a Illustrate what happens during each of the steps required when using machine learning to construct a classifier or predictor.

AI.ML.9-12.F.b Use either a supervised or unsupervised learning algorithm to train a model on real-world data, then evaluate the results.

Natural Interaction

AI.NI.9-12.F.a Construct context-free grammar to parse simple languages and use language-processing tools to construct a chatbot. Use sentiment analysis tools to extract emotional tone from text.

AI.NI.9-12.F.b Demonstrate how sentence parsers handle ambiguity.

AI.NI.9-12.F.c Describe how artificial intelligence drives many software and physical systems.

Societal Impacts

AI.SI.9-12.F.a Critically explore the positive and negative impacts of an AI system.

IMPACTS OF COMPUTING

Culture

IC.Cu.9-12.F.a Analyze new technology to predict realistic impacts on society.

IC.Cu.9-12.F.b Identify how existing and emerging computing architecture has and will impact other professions, both positively and negatively.

Social Interactions

IC.SI.9-12.F.a Evaluate tools to increase connectivity of people in different cultures and career fields.

IC.SI.9-12.F.b Analyze the collection and generation of data through automated processes to explain the privacy concerns that are not always evident to users.

Safety, Law and Ethics

IC.SLE.9-12.F.a Interpret and analyze breaches in privacy and security to investigate the legal and ethical impact in classical and emerging technologies.

IC.SLE.9-12.F.b Analyze the concepts of usability and security to explain typical tradeoffs between them.

IC.SLE.9-12.F.c Analyze the collection and generation of data through automated processes to explain the legal concerns that are not always evident to users.

IC.SLE.9-12.F.d Explain the beneficial and harmful effects of intellectual property laws to determine the impacts on innovation.

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