Computer Science

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This course includes in-depth study of computer history, hardware/software, computer security, networking, web & gaming. Students will develop knowledge and skills through projects that require higher-level problem solving. Students will develop portfolios of completed work. Prerequisite: Approval by instructor. Parent's permission to use the Internet is required for participation in this course. (Semester)

This curriculum is based on standards taken from the Ohio Technology Curriculum Standards and the National Educational Technology Standards for Students developed by ISTE (International Society for Technology in Education).

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Computer History

Past/Present/Future   **Standard 1; Benchmark A:1(10):** Describe how the rate of technolological development and diffusion is increasing rapidly (e.g., a computer system chip has been adapted for use in toys and greeting cards).
Standard 1; Benchmark A:2(9): Describe goal-directed research, define invention and innovation, and explain the relationship among them.
Standard 1; Benchmark A:3(11): Describe, discuss and cite examples of how goal-directed research results in innovation.
Standard 1; Benchmark B:3(12): Predict changes in society as a result of continued technological progress, and defend the rationale.
Standard 2; Benchmark C:2(11): Understand the basic elements of the evolution of technological tools and systems throughout history.
Standard 2; Benchmark E:2(11): Locate and evaluate past predictions about the development of technology.
Standard 3; Benchmark A:1(10): Examine current and past devices for storing data, and predict potential devices for the future.

Careers   **Standard 7; Benchmark E:1(9):** Describe the careers available in information and communication technological systems, and the training needed to pursue them.

Cyber Security

Standard 2; Benchmark A:5(9): Contrast ethical considerations and how they are important in the development, selection and use of technologies.
Standard 2; Benchmark A:3(11): Compare and evaluate the advantages and disadvantages of widespread use and reliance on technology in the workplace, and in society as a whole.
Standard 7; Benchmark E:2(11): Analyze communication systems and identify the source, encoder, transmitter, receiver, decoder, storage, retrieval, and

destination (e.g., telephone, TV, newspaper).

Standard 7; Benchmark E:3(11): . Explain how information travels through different media (e.g., electrical wire, optical fiber, air, space).

NETS: Demonstrate a sound understanding of the nature and operation of technology systems.

Hardware/Software

Standard 1; Benchmark A:3(9): Make informed choices among technology systems, resources and services.

Standard 1; Benchmark A:2(11): Illustrate ways that the rate of technological development and diffusion is exponential.

Standard 1; Benchmark B:1(9): Demonstrate how the stability of a technological system is influenced by all system components, especially those in the feedback loop.

Standard 2; Benchmark B:2(12): Describe the proper disposal and recycling of computer components and other electronic devices.

Standard 3; Benchmark A:3(10): Apply strategies for identifying and solving routine hardware and software problems that occur during everyday use.

Standard 3; Benchmark B:1(10): Utilize advanced word processing and desktop publishing features and programs.

Standard 5; Benchmark D:3(9): Demonstrate the difference between databases, directories and database archives (e.g., free vs. fee-based, delivery mechanism, such as CD, DVD, network, Internet, and general vs. specific discipline).

Standard 5; Benchmark D:2(12): Use a variety of technology resources for curriculum and personal information needs (e.g., streaming video, CD/DVD, subscription database).

Standard 7; Benchmark A:4(9): Identify and apply appropriate safety measures when working with energy and power technologies.

Standard 7; Benchmark A:8(9): Identify and investigate AC and DC circuits (e.g., sources, conductors, controls, loads, applications, purposes, safety, components, symbols, principles and operations).

Standard 7; Benchmark A:8(10): Identify and explain the components of a circuit including a source, conductor, load and controllers (controllers are switches, relays, diodes, transistors, and integrated circuits).

Standard 7; Benchmark E:3(9): Use a variety of information and communication technologies to demonstrate the inputs, processes, and outputs associated with sending and receiving information (e.g., computer and related devices, graphic - technical and communication - media, electronic transmitters and receiving devices, entertainment products, and various other systems).

Networking

Standard 3; Benchmark A:2(9): Create a design for a basic network, and list the skills needed to manage networks.

Standard 3; Benchmark A:2(10): Analyze various types of connectivity, and list pros and cons of each.

Standard 6; Benchmark A:6(9): Brainstorm solutions to problems using common brainstorming techniques (e.g., select a leader, select a recorder, generate ideas, discuss and add on to ideas of others, and recognize that all ideas are welcome).

Standard 6; Benchmark B:5(11): Collaborate with peers and experts to develop a solution to a specific problem.

Standard 6; Benchmark B:6(11): Demonstrate the importance of teamwork, leadership, integrity, honesty, work habits and organizational skills in the design process.

Standard 7; Benchmark E:1(11): Identify information and communication systems that transfer information from human to human, human to machine, machine to human, and machine to machine (e.g., two people talking to each other on the phone; a person inputting data in a computer using a keyboard; an electric fax machine providing a copy of a message to a person; and an automated system transferring financial records from one bank computer to another bank computer).

Gaming

Standard 4; Benchmark A:1(10): Identify and incorporate common organizational techniques used in electronic communication (e.g., cause and effect, compare and contrast, problem and solution strategies).

Standard 4; Benchmark A:2(10): Manipulate communication design elements (image, language, sound and motion) based on intent of the message (e.g., inform or persuade).

Standard 4; Benchmark A:3(10): Interpret ethical considerations and legal requirements involved in construction of communication products.

Standard 6; Benchmark A:1(10): Solve an inventive problem that contains a technical contradiction (e.g., analyze the technical system, state the technical contradiction and resolve the technical contradiction).

Standard 6; Benchmark A:1(12): Implement the design process: defining a problem; brainstorming, researching and generating ideas; identifying criteria and specifying constraints; exploring possibilities; selecting an approach, developing a design proposal; making a model or prototype; testing and evaluating the design using specifications; refining the design; creating or making the item; communicating processes and results; and implementing and electronically documenting the design process.

Standard 6; Benchmark C:1(12): Explain why technological problems benefit from a multidisciplinary approach (e.g., the research and development of a new video game could benefit from knowledge of physiology, reaction times and hand-eye coordination, as well as psychology, attention span, color theory and memory).

Standard 6; Benchmark C:3(12): Apply and evaluate the reverse engineering process in problem-solving.

Ethical and Legal Issues

NETS: Understand the ethical, cultural and societal issues related to technology.

NETS: Practice responsible use of technology systems, information and software.

NETS: Develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.

Standard 2; Benchmark D:1(11): Predict what might happen if the principles of intellectual property were ignored in one's own community.

Standard 2; Benchmark D:1(12): Forecast changes in laws and legislation that might result from the exponential growth of technology.

Standard 2; Benchmark D:3(12): Respect the principles of intellectual freedom and intellectual property rights.

Standard 2; Benchmark D:4(12): Practice responsible and ethical usage of technology.

Standard 4; Benchmark A:3(12): Interpret ethical considerations and legal requirements involved in construction of communication products.

Standard 5; Benchmark A:2(12): Acknowledge intellectual property in using information sources.

Standard 5; Benchmark B:5(11): Respect copyright laws and guidelines, and use standard bibliographic format to list sources.

Standard 5; Benchmark B:3(12): Critique information sources to determine if different points of view are included.

Standard 5; Benchmark B:4(12): Integrate multiple information sources in the research process.

Standard 5; Benchmark B:6(12): Adhere to copyright and intellectual property laws and guidelines when creating new products (e.g., standard bibliographic format, permissions to use information created by others).

Standard 6; Benchmark A:8(9): Recognize that patent trademark and copyright laws protect technological ideas and intellectual property.

Standard 6; Benchmark A:7(12): Predict/project the need for changes in copyright, patent and trademark laws, considering the rapid changes in technology and society.

Productivity

NETS: Use technology tools to enhance learning, increase productivity, and promote creativity.

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NETS: Use technology to locate, evaluate, and collect information from a variety of sources.

NETS: Use technology tools to process data and report results.
NETS: Evaluate and select new information resources and technological innovations based on the appropriateness to specific tasks. Use technology resources for solving problems and making informed decisions.
NETS: Employ technology in the development of strategies for solving problems in the real world.
Standard 4; Benchmark B:1(11): Archive communication products in appropriate electronic forms (e.g., store electronic publications so that they may be accessed when needed).
Standard 4; Benchmark B:1(12): Use Web technologies to disseminate information to a broader audience.
Standard 4; Benchmark B:2(12): Explain evaluation criteria and processes used to communicate with technology (e.g., telecommunications, Wi-Fi, voice over IP).
Standard 4; Benchmark C:3(11): Collaborate in online learning or videoconferencing activities based on research and/or an investigation of real-world problems (e.g., study of community or regional ecosystem).
Standard 4; Benchmark C:1(12): Communicate using all manifestations of e-mail, as needed, for personal and curricular purposes, demonstrating appropriate and responsible use.
Standard 4; Benchmark C:2(12): Use all available online communication capabilities to make inquiries, do research and disseminate results.
Standard 5; Benchmark A:2(11): Analyze the intent and authorship of information sources used for a curricular need.
Standard 5; Benchmark A:3(11): Determine valid information for an assignment from a variety of sources.
Standard 5; Benchmark B:3(11): Identify relevant facts, check for validity, and record appropriate information keeping track of all sources.
Standard 5; Benchmark B:8(12): Archive the final product in a format that will be accessible in the future.

New Technologies

Standard 2; Benchmark A:4(12): Evaluate national and international policies that have been proposed as ways of dealing with social changes resulting from new technologies (e.g., censorship of the media, intellectual property rights or organ donations).
Standard 3; Benchmark B:1(12): Assimilate productivity and technological tools into all aspects of solving problems and managing personal information and communications.
Standard 4; Benchmark C:1(9): Investigate the uses of videoconferencing, Web casting, and other distance learning technologies (e.g., interviews, meetings, course work).
Standard 4; Benchmark C:1(9): Research emerging communication technologies (e.g., wireless systems, open source software and systems, virtual reality).