School District of Springfield Township

Course Overview

Computer Science 9

School Year: 2010-2011

Standards Guiding Course

PA State Science and Technology Standards:

3.1.10 A. Discriminate among the concepts of systems, subsystems, feedback and control in solving technological problems.
3.1.10.B. Describe concepts of models as a way to predict and understand science and technology.
3.1.10.C. Apply patterns as repeated processes or recurring elements in science and technology.
3.1.10.D. Apply scale as a way of relating concepts and ideas to one another by some measure.
3.1.10.E. Describe patterns of change in nature, physical and man made systems.
3.2.10.A. Apply knowledge and understanding about the nature of scientific and technological knowledge.
3.2.10.B. Apply process knowledge and organize scientific and technological phenomena in varied ways.
3.2.10.C. Apply the elements of scientific inquiry to solve problems.
3.2.10.D. Identify and apply the technological design process to solve problems.
3.6.10.B. Apply knowledge of information technologies of encoding, transmitting, receiving, storing, retrieving and decoding.
3.6.10.C. Apply physical technologies of structural design, analysis and engineering, personnel relations, financial affairs, structural production, marketing, research and design to real world problems.
3.7.10.A. Identify and safely use a variety of tools, basic machines, materials and techniques to solve problems and answer questions.
3.7.10.B. Apply appropriate instruments and apparatus to examine a variety of objects and processes.
3.7.10.C. Apply basic computer operations and concepts.
3.7.10.D. Utilize computer software to solve specific problems.
3.7.10.E. Apply basic computer communications systems.
3.8.10.A. Analyze the relationship between societal demands and scientific and technological enterprises.
3.8.10.B. Analyze how human ingenuity and technological resources satisfy specific human

needs and improve the quality of life.
3.8.10.C. Evaluate possibilities consequences and impacts of scientific and technological solutions.

PA State Language Arts Standards:
1.5.11.A. Write with a sharp, distinct focus.
1.5.11.B. Write using well-developed content appropriate for the topic.
1.5.11.C. Write with controlled and/or subtle organization.
1.5.11.D. Write with a command of the stylistic aspects of composition.
1.5.11.E. Revise writing to improve style, word choice, sentence variety and subtlety of meaning after rethinking how questions of purpose, audience and genre have been addressed.
1.5.11.F. Edit writing using the conventions of language.
1.5.11.G. Present and/or defend written work for publication when appropriate.

CSTA Model Curriculum for K-12 Computer Science (Level II):
1. Principles of computer organization and the major components
2. The basic steps in algorithmic problem-solving
3. The basic components of computer networks
4. Organization of Internet elements, Web page design, and hypermedia
5. The notion of hierarchy and abstraction in computing, including high-level languages, translation, machine languages, instruction sets, and logic circuits
6. The connection between elements of mathematics and computer science, including binary numbers, logic, sets, and functions
7. The notion of computers as models of intelligent behavior and what distinguishes humans from machines
8. Examples that identify the broad interdisciplinary utility of computers and algorithmic problem-solving in the modern world
9. Ethical issues that relate to computers and networks, and the positive and negative impact of technology on human culture
10. Identification of different careers in computing and their connection with the subjects studied in this course

Enduring Understandings
All computers are comprised of component systems that work together.
Many problems can be efficiently solved with an algorithmic problem solving process.
Any connection between multiple computers is a network.
The Internet is a global network that provides many useful services and requires careful risk assessment.
Advances in technology and computer science have raised new and difficult legal and ethical issues.
Creating a web site requires planning, thinking about your user, and creating well-formed markup code.
Each type of multimedia has its own issues and uses.
Complex concepts can be abstracted and converted into hierarchies as useful representations of information.
Number systems, Boolean expressions and functions are common to both mathematics and

computer science.
“Intelligent” machine behavior is not “magic” but the result of algorithms applied to useful representations of information.
Computer Science has broad, interdisciplinary applications in the modern world.
Writing a program means giving the computer specific instructions.

Essential Questions

What is a computer?
How are computers and computer networks organized?
Why do people use software?
What problem-solving techniques are employed by computer scientists?
In what ways can we consider software to be tools?
Why do people develop software?
How are websites developed?
How do abstraction and algorithm development impact your life?
What does it mean to be human in a world of technology?
Should we share intelligence with machines?
How do we share intelligence with machines?

Unit Titles

Humans and Computers [CSTA Topics 1, 3, 7, 8]
Problem Solving [CSTA Topics 2, 6]
Developing Solutions [CSTA Topics 2, 3, 4, 5, 12, 13]
Introduction to Programming [CSTA Topics 1, 5, 6, 7, 8, 11]

Key Skills/Processes

Describe functions of major components of computing systems and networks
Apply basic computer operations of input, output, processing, and networking
Algorithmic problem solving
Productive use of electronic communications
Organize technical processes in a variety of ways – create multiple taxonomies
Model multiple layers of abstraction in real life and computing
Create abstract algorithms to solve classes of problems in software development
Compare elements of mathematics and computer science (binary numbers, logic, sets, and functions)
Use logic to understand technological processes such as programming
Simplify complex processes via creation of functions as patterns
Define intelligence as it relates to humans and machines
Evaluate the potential consequences of technology on humanity
Analyze how human and technological innovation improve quality of life
Distinguish the differences between high-level languages, machine languages, instruction sets, and logic circuits

Analyze the relationship between society and technology
Describe state changes in programs
Apply technological design process to solve software and web design problems
Encode, compress, transmit, receive, store, retrieve and decode files in web design
Choose the correct software to solve a particular problem
Communicate effectively using computer based systems
Compose writing with effective organization, style and content
Revise and edit writing to improve conventions and style
Present written work for publication to authentic audience
Create précis of articles that are free of personal opinion and reflect author bias
Summarize assigned readings with appropriate use of paraphrasing
Create annotated bibliographies that support the original article

Course Description

Computer Science 9 provides students with general knowledge about computer hardware, software, languages, networks and their impact in the modern world. Students acquire a fundamental understanding of the operation of computers and computer networks and create useful programs implementing simple algorithms. By developing web pages that include images, sound, and text, students acquire a working understanding of the Internet, common format for data transmission, and insight into the design of a human-computer interface.