East Penn School District
Curriculum and Instruction

Curriculum for: Computer Science Department

Course(s): Programming I

Grades: 9-12

Department: Computer Science **Length of Period (average minutes): 41**

Periods per cycle: 6 **Length of Course (yrs): 0.5**

Type of offering: _____ required ___X___elective **Credit(s) awarded: 0.5**

Developed by: Cindy Brashear, Beth Stoudt

ADOPTED:

Enduring Understanding	Essential Questions	Content	Standard**	Skills
How a Computer Works	What are the primary hardware components of a computer, and what are their functions? What are types of software? How have storage devices changed?	The Anatomy of a Computer Computer Hardware and Software Application vs. System Software Types of Storage Devices	CD.L1-01: Recognize that computers are devices that execute programs. CD.L2-03: Demonstrate an understanding of the relationship between hardware and software. CD.L3A-05: Explain the multiple levels of hardware and software that support program execution (e.g., compilers, interpreters, operations systems, networks).	Students will: ● identify the major hardware components. ● identify software vs. hardware components. ● know the difference between system and application software. ● identify types of storage devices and the historical development of these devices.
A computer stores information in digital format	What are binary numbers? How does a computer store characters and numbers? How are audio files stored? How are video files stored?	Computer Number Systems ASCII and Unicode sets RGB values Digitizing Data	CT.L2-07: Represent data in a variety of ways including text, sounds, pictures, and numbers. CT.L3A-07: Describe how various types of data are stored in a computer system. CT.L3B-07: Discuss the interpretation of binary sequences in a variety of forms (e.g., instructions, numbers, text, sound, image). CT.L3A-05: Describe the relationship between binary and hexadecimal representations.	Students will: ● convert between binary, decimal, octal, and hexidecimal number systems. ● understand how the computer stores different data types.
The development of computing devices falls into 5 main generations	What were some of the early mechanical devices the preceded the development of the modern computer? Who were some of the main contributors to the development of computers? Are there similarities between early devices and current devices? What are the main developments in each of the generations?	Early computing devices Five Generations of computer developments (important people, devices and technologies)	CI.L2-02: Demonstrate knowledge of changes in information technologies over time and the effects those changes have on education, the workplace, and society. CI.L2-03: Analyze the positive and negative impacts of computing on human culture.	Students will: ● identify the major developments, important figures, and new devices in each of the generations.
Algorithms are logical sets of steps to solve problems	How are algorithms used to solve problems?	Tracing programs De-bugging	CT.L2-01: Use the basic steps in algorithmic problem-solving to design solutions. CT.L2-03: Define an algorithm as a sequence of instructions that can be processed by a computer.	Students will: ● write algorithms to perform specific tasks. ● trace programs to determine the projected outcome.

				• trace programs to find, fix, and classify errors.
Variables and constants are essential to store data in programs	When would a variable be used instead of a constant in a program? How are variables used for input and calculations?	Numeric, string, and Boolean data types Naming conventions Use of constants	CT.L3A-07: Describe how various types of data are stored in a computer system.	Students will: • understand in which situation variables and constants should be used. • be able to use appropriate naming conventions for variables and constants.
Input and output are used to move information into and out from a program	How do you use input and output to get and display information?	Using the input function Displaying and formatting output	CD.L3A-04: Compare various forms of input and output.	Students will: • develop lines of code to retrieve input from a user. • develop lines of code to display output. • format output appropriately.
Data types are used to classify variables into different categories	What are the different data types used to classify variables into different categories?	Integer vs. Floating Point numbers Strings	CT.L3A-07: Describe how various types of data are stored in a computer system.	Students will: • use data types appropriately in the context of a specific problem.
Arithmetic expressions are used to compare and modify data	How are arithmetic expressions used to perform calculations and comparisons?	Math Operators Order of Operations	CPP.L3A-12: Describe how mathematical and statistical functions, sets, and logic are used in computation.	Students will: • use math operators and grouping symbols to accurately solve problems.
Control structures direct program flow	What is the order in which a computer executes program statements?	Sequential Structure Decision Structure/Conditional Statements Repetition Structure Functions	CT.L3A-03: Explain how sequence, selection, iteration, and recursion are building blocks of algorithms. CPP.L2-05: Implement problem solutions using a programming language, including: looping behavior, conditional statements, logic, expressions, variables, and functions.	Students will: • write program statements in the correct sequence to solve specified problems. • use “if” statements efficiently to control the flow of a program. • use loops efficiently to repeat actions in a program. • create functions to perform basic tasks.
Comparison and Boolean operators are used to make programming decisions	How are comparison and Boolean operators used by the computer to make decisions?	Logical operators Truth Tables And/or	CT.L2-14: Examine connections between elements of mathematics and computer science including binary number, logic, sets, and functions.	Students will: • effectively use logical operators to make decisions in programs.

				• use truth tables to determine outcomes from logic statements.
Repetition structures direct program code to repeat a block of code	What are the differences between a definite and indefinite loop structure? When would one utilize each type of loop structure? How can nesting increase program efficiency?	For Loop While Loop	CT.L3A-03: Explain how sequence, selection, iteration, and recursion are building blocks of algorithms. CPP.L2-05: Implement problem solutions using a programming language, including: looping behavior, conditional statements, logic, expressions, variables, and functions.	Students will: • determine the difference in functionality beween a for loop and a while loop. • use for loops and while loops accurately to solve problems.
Programming statements can be used to draw graphics	What program statements are necessary to draw simple graphics?	Drawing Basic Shapes using Graphics Library	CPP.L3A-05: Use Application Program Interfaces (APIs) and libraries to facilitate programming solutions.	Students will: • write program statements to draw simple graphics.

**All standards are from the Computer Science Teachers Association (CSTA) K-12 Computer Science Standards, Revised 2011.

Materials and Resources:
Python programming platform
Online resources
Textbook