Davison Community Schools
ADVISORY CURRICULUM COUNCIL
PHASE II

AP Computer Programming

Enduring Course Goals (from Phase I):

What is a class and what does it contain?
What is an object and how is it created?

Unit: 1 – Primitive Data & Introduction to Objects

Essential Question(s)	Essential Understanding(s)
1. What are the 4 primitive data types in Java? 2. What is a class? 3. What is an object? 4. How are multiple characters stored in a variable? 5. What is a Wrapper class? 6. What is a method?	• The 4 primitive data types in Java are: Boolean, Char, Int, and Double. • A class is a collection of code that usually represents a noun. It is the "blueprint" that is used to make an object. • An object is a piece of information/data that is encapsulated in a single entity. This information/data has specific characteristics and behaviors. It is created following the "blueprint" of a class. • Multiple characters are stored using a String object, which provides extra functionality to the characters stored in the object. • A Wrapper class is a class/object that exists to hold primitive data. • A method is a behavior or function that an object can perform.

Curriculum Standards:	Knowledge/Content	Skills/Processes

SKILLS/BENCHMARKS:
 	
 Goal 1 – Students are taught the 4 primitive data types (boolean, char, int, and double) that are embedded in the Java programming language.
 	
 Goal 2 – Students are taught the definitions of a class and an object and the relationship these two components share within the Java programming language.
 	
 Goal 3 – Students are introduced to common classes, such as the String class and Wrapper classes, within a java program.
	Students will know …
	
	 • Primitive Data Types
	  - Char, Boolean, Int, Double
	 • The relationship between a Class and Object.
	 • Understand basics of common classes, such as:
	  - Wrapper Class
	  - String Class
	 • Methods and their role in an object/class
		Students will be able to…
		
		 • Use pre-defined classes/objects to solve problems.
		
		 • Use common String class methods to solve problems.
		
		 • Use Wrapper classes to solve problems.

Davison Community Schools
ADVISORY CURRICULUM COUNCIL
PHASE II

AP Computer Programming

Enduring Course Goals (from Phase I):

   What is an object and how is it created?

Unit: 2 Using Objects

Essential Question(s)	Essential Understanding(s)
1. How is an object created? 2. How can a program receive data from a user via the keyboard? 3. What is an applet? 4. What is the difference between a static method and a regular method?	• An object is created using the instantiation process, which involves using the "new" keyword. • A program receives data from a user via the keyboard using a Scanner Object from the Scanner class. • An applet is a web-based program that is executed using a web browser and does not contain a "Main" method. • The difference between a static method and a regular method is that a static method is invoked using the class name and a regular method is invoked using an instantiated object.

| Curriculum Standards:
 SKILLS/BENCHMARKS:
 Goal 4 – Students are taught how to create and use an object within a Java program.
 Goal 5 – Students are taught how to receive data from a user via the keyboard using the Scanner class.
 Goal 6 – Students are introduced to applets. They are taught how to create and execute applets using the Java programming language.
 Goal 3 – Students are introduced to common classes, such as the Scanner class, math class, and graphics class. | Knowledge/Content
 Students will know …

 • Applet creation and execution
 • Static method usage
 • Understand basics of common classes, such as:
 • Scanner class for keyboard input
 • Math class for calculations
 • Color class
 • Graphics class
 • Numberformat class
 • Decimalformat class | Skills/Processes
 Students will be able to…

 • Create an use applets to solve problems.
 • Determine and use the appropriate class(es) to solve problems. |

Davison Community Schools
ADVISORY CURRICULUM COUNCIL
PHASE II

AP Computer Programming

Enduring Course Goals (from Phase I):

 What programming components create non-linear processing?

Unit: 3 Program Statements

Essential Question(s)	Essential Understanding(s)
1. What programming component prevents a programming from running all code from top to bottom, but instead causes it to run certain code based on various situations? 2. How does a program differentiate between various situations during run-time in order to run the appropriate code in an If/Else IF/Else statement block and a switch statement? 3. What programming component is used to run the same code for a set number of iterations or until a condition is met? 4. What is the main reason for using the StringTokenizer class?	• An If/Else IF/Else statement block can be used to cause a programming to run certain segments of code as well as exclude other segments of code based on various situations. • A program uses logical operators and compares variables/literals using relational operators to determine the correct code to execute during run-time. • A loop is used to run a segment of code for a set number of iterations or until a condition is met. The 3 types of loops are For, While, and Do-While. • The StringTokenizer class can easily break up a phrase into individual words.

Curriculum Standards: SKILLS/BENCHMARKS:	Knowledge/Content Students will know …	Skills/Processes Students will be able to…
Goal 7 – Students are taught some scenarios of when the StringTokenizer class would be used within a Java program. **Goal 8** – Students are taught how to implement If/Else If/Else blocks and switches into a program to allow it to run certain segments of code when certain situations exist. **Goal 9** – Students are taught the three types of loops (for, while, do-while) and how to implement them into a program.	• When to use "If" statements • When to use "If / Else" statements • When to use "If / Else If / Else" statement blocks • Creation and implementation of 3 types of loops: • For loop • While Loop • Do-While Loop • StringTokenizer Class creation and execution	• Write programs containing If/Else IF/Else statement blocks • Write programs that use each of the 3 types of loops • Write a program that divides a phrase into each individual word using the StringTokenizer class.

AP Computer Programming

Enduring Course Goals (from Phase I):

What is a "Class" and what does it contain?
What is an "object" and how is it created?

Unit: 4 Writing Classes

Essential Question(s)	Essential Understanding(s)
1. What components are required when creating a class? 2. What components are necessary to create a class method? 3. What does it mean to overload a method? 4. What are the two main methods in all JApplets and what are their functionality?	• When creating a class, the name of the file must match the name of the class and the phrase "public class" must appear at the top. • A class method must have the following components in order to run correctly: visibility modifier, header, body, and return type. • Method overloading is the process of creating multiple methods with the same name, but are different in other ways. • The two main methods in all JApplets are the init() method and the paint() method. The init() method is used to run all processes that are required when the JApplet is initialized. The paint() method is used to display data while the JApplet is executing.

Curriculum Standards: SKILLS/BENCHMARKS:	Knowledge/Content Students will know …	Skills/Processes Students will be able to…

Goal 10 – Students are taught the components necessary to create a class and a class method.
 	
Goal 11 – Student are taught the meaning of method overloading and how to implement it within a Java program.
 	
Goal 12 – Students are taught the two main methods that are are used in a Java JApplet as well as their functionality.
	• Method Overloading implementation and its benefits
	• Main JApplet Methods and their function.
	  - Init()
	  - Paint()
		• Create their own class to solve a problem.
		• Create a method within their class to solve a problem.
		• Overload a method in order to solve a variety of problems.
		• Give functionality to the init() and paint() methods within a JApplet to solve a problem.

AP Computer Programming

Enduring Course Goals (from Phase I):

What is the difference between an applet and an application?
What is an interface and why is it important?

Unit: 5 Enhancing Classes

Essential Question(s)	Essential Understanding(s)
1. What is an object reference variable and what does it store? 2. What is an application? 3. What is a GUI and what does it include? 4. What is an interface and what does it contain?	• An object reference variable stores a specific objects memory address and is used to access the data in an object and invoke the object's methods. • An application is a program that contains a "Main" method and contains a GUI. • GUI stands for Graphical User Interface, which is the part of a computer program that interacts with the user. All GUIs contain components, events, and listeners. • An interface is not a class. It is a module than can be attached to a class to provide it with specific methods and constants.

Curriculum Standards: SKILLS/BENCHMARKS:	Knowledge/Content Students will know …	Skills/Processes Students will be able to…

Goal 13: Students are taught the definition of a Java application and the components necessary to run a Java application.
 	
Goal 14: Students are taught the meaning for the acronym, GUI, and the 3 elements that are essential to creating and implementing it.
 	
Goal 15: Students are taught the definition of an interface, how it is beneficial to a Java program, and how to implement an interface within a Java class.
 	
Goal 16: Students are taught the similarities and differences between abstract methods and standard methods.
	• Creating and using object reference variables
	• Important parts of a Java Application
	• GUI (Graphical User Interface) necessities:
	  - Components
	  - Events
	  - Listeners
	• Declaration and usage of interfaces
	• Similarities and differences between abstract methods and standard methods
	• Declaration and usage of constants
		• Create object reference variable within a program to modify and access an object.
		• Create an application that uses a GUI to solve a problem.
		• Create an interface, which contains abstract methods and constants, and implement it within a class to solve a problem.

AP Computer Programming

Enduring Course Goals (from Phase I):

What is an array and why is it useful?

Unit: 6 Arrays

Essential Question(s)	Essential Understanding(s)
1. What is an array? 2. What information must be included when creating an array. 3. How is data in an array stored and accessed? 4. What are ArrayLists and how are they different than arrays? 5. What are the two sorting algorithms for sorting data in an array? 6. What are the two searching algorithms that are used for searching for a target value in an array?	• An array is a single object that stores multiple values of the same data type. • When declaring an array, its data type and size must be known and included. • An array is divided into elements. Each unit of data is stored in a single element and accessed using the element's index value. • An ArrayList is a specific class that holds information similar to an array, however it does not have a data type and its size does not need to be included when declared. • The Insertion sort and the Selection sort can be used to sort data contained in an array. • The Linear search and the Binary search can be used to search for a target value in an array.

Curriculum Standards:	Knowledge/Content	Skills/Processes
SKILLS/BENCHMARKS: **Goal 17** – Students are taught how to create one or more arrays in a Java program of any size and dimension. **Goal 18** – Students are taught how to store literals in an array of any size and dimension. **Goal 19** – Students are taught how to access literals in an array of any size and dimension. **Goal 20** – Students are taught how to implement one or more ArrayLists within a Java program. **Goal 21** - Students are taught how to sort literals in an array in either ascending or descending order using the Insertion sort method and the Selection sort method. **Goal 22** - Students are taught how to search through literals in a sorted or unsorted array using the binary search and linear search to find a target value.	Students will know … Common components associated with an array, such as: • Array Elements • Array Index Values • Array and ArrayList Declaration & Initialization • Two popular algorithms for sorting an array: • Insertion sort • Selection sort Two popular algorithms for searching an array: • Linear Search • Binary Search	Students will be able to… • Create an array of specified size and data type. • Store data in an array • Access data from an array • Use an array in a program to accomplish a specified task. • Create a program that searches data stored in an array using the appropriate search to find a specified target value.

AP Computer Programming

Enduring Course Goals (from Phase I):

What is inheritance and why is it important?

Unit: 7 Inheritance

Essential Question(s)	Essential Understanding(s)
1. What is a parent class? 2. What is a subclass/child class? 3. Why is inheritance important? 4. What is the super reference and how is it used? 5. What is polymorphism?	• A parent class is a class that belongs to a hierarchy in which a class is underneath it. • A subclass/child class is a class that extends a parent class. It receives all of the parent's public variables and public methods through the inheritance process. • Inheritance allows programmers to reuse code and give parts of their code much broader functionality capabilities. • The super reference is a way to access a parent's methods or variables. It is most commonly used to access the parent's constructor to initialize variables within the parent class. • Polymorphism is the ability for a object reference variable, which has been declared to reference a parent class is now referencing objects that are a subclass of the parent.

| Curriculum Standards:
 SKILLS/BENCHMARKS:
 Goal 23 – Students are taught how to implement inheritance principles into a Java program. | Knowledge/Content
 Students will know …
 Implementation of inheritance principles:
 • Parent class
 • Subclass / Child class
 • Super Reference
 • Protected Variables
 • Polymorphism | Skills/Processes
 Students will be able to…
 • Create a group of classes that resemble a hierarchy and use the inheritance process to pass code from parent classes to subclasses.
 • Use the super reference within a subclass to access a parent's constructor.
 • Use polymorphism to access a variety of objects using a single object reference variable. |