UR East Overview of Year
Grade 11-12 Curriculum: Computer Programming

SEPT	OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	JUNE

Unit 1	Unit 2	Unit 3	Unit 4
Programming Fundamental	**Introduction to Python-Part I**	**Introduction to Python-Part II**	**Java Fundamentals**

Unit 1- Programming Fundamentals	Understanding	Essential Question
CDOS Standards (Career Development and Occupational Studies): 1, 2, 3a, and 3b **CCTC Standards (Common Career Technical Core)*** Information Technology Career Cluster® IT-PRG 2.1: 4.1: 4.3: 5.1: 6.1 **CCR- ELA** *Text Types and Purposes* **2, 3** *Writing* **4, 5, 6** *Research* **7, 8** *** National Association of State Directors of Career Technical Education Consortium (NASDCTEc)**	**Enduring Understandings** *Scholars will understand how to* **U1** Solve basic programming problems using a variety of skills and strategies. **U2** Use pseudo-code and visual modeling to prepare clear and accurate program documentation and models. **U3** Examine working programs to identify their structures. **U4** Apply appropriate techniques to create entry-level programs from models. **U5** Creating web apps, games, and search engines all involve storing and working with different types of data. They do so using variables.	**Essential Questions** *Scholars will consider such questions as…* • **(Hook) How do we solve problems in our lives?** • What is programming and what is not programming? • What kinds of things can programmers build using coding software? • How can computer programs make problem solving easier and more efficient? • What skills and behaviors do I need to develop to become an efficient programmer? • Why is planning important when designing a program? • What are necessary questions to ask before a program is created? • How can a program be written so that the user of the program can interact with it (by providing it with information) while it is running?
Performance Task: Scholars will create a payroll program using pseudocode that must: implement a "sequence" function, a "while" (looping) function, and an "if-then-else" (selection) function, to write a "proper" algorithm for a workers final take home pay and produce output in the form of a pay stub.		
Common Formative Assessments: *Career Pathways programs will monitor universal employability skills for each student. These will be formally assessed with an Employability Profile.*		

Unit 2- Introduction to Python- Part I	Understanding	Essential Question
CDOS Standards (Career Development and Occupational Studies): 1, 2, 3a, and 3b **CCTC Standards (Common Career Technical Core)*** Information Technology Career Cluster® (IT) PRG 2.1: 4.1: 4.3: 5.1: 6.1 **CCR- ELA** *Text Types and Purposes* **2, 3** *Writing* **4, 5, 6** *Research* **7, 8** *** National Association of State Directors of Career Technical Education Consortium (NASDCTEc)**	**Enduring Understandings** ***Scholars will understand that…*** **U1** Python is a popular, **Object Oriented** general-purpose, multi-paradigm, open-source, scripting language used by sites like YouTube and Dropbox. **U2** Python is designed to emphasize code readability – has a clean syntax with high level data types. **U3** Python has a large number of available and well-written modules **U4** The class is a fundamental building block in Python. Understanding what classes are, when to use them, and how they can be useful is essential to good programming in Python **U5** Classes are; a way of thinking about programs. "Classes" and "objects" are words that are often used interchangeably, but they're not really the same thing. Understanding what makes them different is the key to understanding what they are and how they work.	**Essential Questions** *Scholars will consider such questions as…* • (Hook) So who uses Python and what for? • How does a good design improve the efficiency? • Why is thoughtful design the most critical step in the development lifecycle? • What sort of language is Python? • How do you setup the Python environment and run Python scripts? • How does Python handle input/output? • How do you import and call functions?
Performance Tasks: Scholars will be responsible for what many experts say are 5 Crucial Projects for Beginners: Guess My Number: The computer randomly generates a number. The user inputs a number, and the computer will tell you if you are too high, or too low. Then you will get to keep guessing until you guess the number**. Sentence Generator:** A series of different parts of sentences will be randomly put together to come up with new interesting sentences. **Area Calculator:** The user will be prompted with a menu where he/she will select a shape. Then the user will give the appropriate information needed to solve for the area, and the computer will give the area! Hope you all have taken geometry! **Address Book:** The user wants to create an address book and downloads your program. How would you make it? Create a program that prompts the user for the information in most address books and then stores it in a .txt file! **Text Game:** A complete text game, be able to move through rooms on users command, get descriptions of each room, be able to interact within rooms, be able to gain items to gain treasure in the game.		

Unit 3- Introduction to Python – Part II	**Understanding**	**Essential Question**
CDOS Standards (Career Development and Occupational Studies): 1, 2, 3a, and 3b **CCTC Standards (Common Career Technical Core)*** Information Technology Career Cluster® (IT) PRG 2.1: 4.1: 4.3: 5.1: 6.1 **CCR- ELA** *Text Types and Purposes* **2, 3** *Writing* **4, 5, 6** *Research* **7, 8** *** National Association of State Directors of Career Technical Education Consortium (NASDCTEc)**	**Enduring Understandings** *Scholars will understand that…* **U1** Python and all computer languages have common structures. If you know the proper programming techniques and how to program in one language, learning another language is faster and easier than the first. **U2** Design is a critical component of software development. **U3** Programmers in Python utilize lists and dictionaries to store and manipulate data; and must determine whether a list or a dictionary is an appropriate data structure for a given application. **U4** Python or OOP is used in graphics and image processing.	**Essential Questions** *Scholars will consider such questions as…* • (Hook) **What is a decision and is there a process for making one?** • How does Python handle making decisions (i.e. control statements)? • How does Python deal with the storage and manipulation of large data sets? • How does the use of functions assist the programmer in writing more organized and efficient code? • What is a dictionary? • Why are functions important? • How do you work with strings and document programs? ____ • What is Turtle Graphics and how is it used in Python? • • How are objects instantiated using Turtle Graphics? • • How is a CFG file set up using IDLE? • • What is Image Processing in Python? • • How are images converted in Python?
Performance Task: Scholars will perform a summative project which is a simple but fun platform game created in python using pygame. The game contains a single player mode and a two player mode.		
Common Formative Assessments: *Career Pathways programs will monitor universal employability skills for each student. These will be formally assessed with an Employability Profile.*		

Unit 4- Java Fundamentals	Understanding	Essential Question
CDOS Standards (Career Development and Occupational Studies): 1, 2, 3a, and 3b **CCTC Standards (Common Career Technical Core)*** Information Technology Career Cluster® (IT) PRG 2.1: 4.1: 4.3: 5.1: 6.1 **CCR- ELA** *Text Types and Purposes* **2, 3** *Writing* **4, 5, 6** *Research* **7, 8** *** National Association of State Directors of Career Technical Education Consortium (NASDCTEc)**	**Enduring Understandings** *Scholars will understand that…* **U1** Java differs from other OOP languages in that its compiler translates code into java byte code for interpreting by the JVM. **U2** Whether you use an IDE or the terminal, the edit, compile, execute process is how computer programs are implemented. **U3** Java evaluates mathematical expressions differently than other computer languages. **U4** In Java, objects have behaviors and respond to messages. **U5** Logic, syntax, and run-time are the three types of errors encountered in any programming language. **U6** How objects and primitive data are used as key elements in writing a Java program. **U7** Java's use of classes is similar to Pythons, and new classes are derived from existing classes	**Essential Questions** *Scholars will consider such questions as…* • Why Java? • What is the JVM and byte code? • What is the edit, compile, execute procedure? • What is the structure of a simple Java program? • How does Java interpret mathematical expressions? • Why are naming conventions important in any programming language? • How does Java handle the manipulation of mixed data types? • How are messages sent to objects? • What are the types of errors one can encounter in a Java program? • How can objects in Java be used to simulate solving real-life problems? • How are new classes derived from existing classes? How are class hierarchies created? • How can inheritance be used to design object-oriented software applications?
Performance Task: Scholars will perform a summative project which is a simple Bank Balance program that prompts the user for a starting balance and then prints the number of years it takes to reach $100,000 and also the number of years it takes to reach $1,000,000.		
Common Formative Assessments: *Career Pathways programs will monitor universal employability skills for each student. These will be formally assessed with an Employability Profile*		