OBJECT-ORIENTED PROGRAMMING

Concept Overview

Object-oriented programming centers around the idea that we can create multiple classes, each with a separate file. Once a class is defined, we can create objects, which are instances of one class, in other classes and programs. Within each class, several things are present, which are necessary for their function. First, any variables used by an object in the class are declared, as well as a definition of the objects in the class. Next, there is a definition for what an object (instance of this class) will be, how to assign values to the instance variables, and how that object might behave. Next, there would be any relevant methods that can be used on or with objects of the class. For example, let's consider a rectangle class. The rectangle class might contain instance variables for length and width. The definition for a rectangle object might ask for a length and a width and then assign the provided values to those variables when an object is created. Lastly, there may be methods to get or change either the length or width, get the area of the rectangle, or get the state of the rectangle.

In addition to the variables and methods for the class, other methods and classes can be imported to be used in the class if necessary. For example, if we wanted to create or set a rectangle to have a random width and length, we could import random from the math class to use for that purpose.

How OOP Will Fit Into My Teaching Context

Due to the nature of the courses I currently teach, there isn't much room for teaching object-oriented programming in Python. With AP CSP, there is a lot of material that needs to be covered in addition to coding, so there isn't a lot of time to add object-oriented programming to that. Currently, I teach AP CSP in JavaScript, though I could switch it to Python and then do some introduction to object-oriented programming after the AP exam in May. My other course, AP Computer Science A, is an introduction to Java, so it centers around object-oriented programming. Learning object-oriented programming in the context of Python has definitely informed my understanding of how it works in Java and how to better understand and teach the material for that course.

Proposal for Teaching OOP

One proposal for teaching object-oriented programming is to create a course that would be an alternative to AP Computer Science A, that offers an introduction to Python. This course would be designed for those who do not have any experience teaching computer science and would begin with the basics of coding. The course could be designed with a similar structure to AP CSA, in that it keeps object-oriented programming at the forefront, but the students learn the other skills such as control structures, etc. as they move through the course. The games unit, or one that is similar, would be a great final unit, with the Game Project being a nice final project and a way for students to demonstrate and extend what they have learned in the course.