Title: Teaching APCS Principles with Python

Short Desc: We will discuss a curriculum that I created that uses Python based on the NEW APCS Principles 2020-2021 Conceptual Framework from the College Board.

Description:

With some of the recent breakthroughs in machine learning and artificial intelligence, Python has become one of the most popular language among developers. It is an easy-to-learn, expressive and powerful language, making it an ideal language for beginner programmers. The curriculum that I created seeks to integrate Python in the teaching of the Big Ideas from the new 2020-2021 APCS Principles Conceptual Framework. Students will have the chance to apply Python in many interdisciplinary contexts including:

1) reading in the entire works of Shakespeare and programmatically analyze its word frequency.

2) work with and manipulate images using Numpy.

3) analyze and manipulate audio .wav files with Python and programmatically determine what note or chord is played on various instruments.

4) import large datasets including medical records, housing prices and clean and analyze the data with Pandas.

5) write a program that recognizes handwritten digits using a neural network.

Learning Outcomes:

1) Participants will be able to analyze a specific project from the curriculum and develop a lesson plan to teach the project.

2) Participants will be able to compare the learning objectives from a programming project to those from the Conceptual Framework and see how they are aligned.

3) Participants will be able to compare some key differences between teaching APCS Principles with Java vs. Python.

Sesssion:

1) Overview of some of the key features of the curriculum. (10 minutes)

2) Differences between Java vs. Python in APCS Principles. I have taught using both before. (10 minutes)

3) In-depth walkthrough of some of the projects including the learning objectives and goals. (20 minutes)

4) Try to code a lab. Participants will be asked to code a solution to a short lab. (20 minutes)

5) Questions and Answers (15 minutes)