Python Programming

"An introduction to the fundamental concepts and models of application development including the basic concepts of program design, data structures, programming, problem solving, programming logic, and fundamental design techniques for event-driven programs. Hands-on experience with a modern application programming language and development platform." ITIS 130

Presentation

This is a "train-the-trainers" workshop about the "Programming Concepts" C-ID course ITIS 130, using the Python language. It's expected that the "students" already know and teach programming concepts, using languages other than Python. The workshop will cover all topics from the ITIS 130 course outline, but they will be divided like this:

- **Sharing** what works (and what does not) when teaching a course like ITIS 130,
- **Practical considerations** – installing software for developing and running in Python, and
- **Hand-on exercises** designed to gain a working knowledge of Python, comparing and contrasting to C++ and Java.

Curriculum

We have 9 sessions in the mornings and afternoons of the week of June 20th. Here's what we'll do in those sessions:

Monday morning, June 19th

1. ITIS 130 learning outcomes
2. Installing Python and Code Editors
    a. On instructors' PCs and Macs
    b. What to tell your IT re lab computer installs
    c. What to tell your students for home computer installs
3. Hands-on: "Hello, World"
4. Command-line vs PyCharm vs repl.it
5. Resources and reference materials

Monday afternoon, June 19th

1. Sharing: Program design
    a. When to teach program flow logic
    b. How to teach program design: algorithm, flow-charts, etc?
2. .py Code structure – left-edge justification
3. Variables: naming (C convention) and declaring (not!)
4. Literals: decimals and quotes and apostrophes
5. Hands-on: "Making Change, 3.4" and "My Days, 3.5"

Tuesday morning, June 20th

1. Binary operations: C/C++/Java standards
    a. whole number division
    b. swapping
2. Library functions
    a. Console input
3. Output formatting
4. Hands-on: “Mortgage Calculator, 4.1 and 5.1”
5. Sharing: favorite introductory assignments

Tuesday afternoon, June 20th

1. If-logic
2. Gaming – randomizing
3. Loop syntax
4. Hands-on: “Input Validation, 6.2”, “Coin Toss, 6.5, 7.4 and 7.5”, “Over-Under Guessing Game, 6.6 and 6.7”
5. Demonstration: round-off error
6. Sharing: favorite introductory games

Wednesday morning, June 21st

1. Sharing
    a. command-line vs PyCharm vs repl.it
    b. code editor options – configuration issues
2. For-loops
3. If else-if logic
4. Hands-on: “Rock-Scissors-Paper, 7.8”

Wednesday afternoon, June 21st

1. Programmer-written functions
2. Hands-on: “Password Protection, 8.3 and 8.4”, “3-Question Quiz, 8.5 and 9.1”
3. Entry point options in Python
4. Sharing: main() or not main()?

Thursday morning, June 22nd

1. Python “arrays”, tuples, and lists
2. Array-based lists
3. Hands-on: “MP3 Player, 13.3”

Thursday afternoon, June 22nd

1. Objects
2. Linked lists
3. Hands-on: “Game Of War, 6.8, 7.6, 7.7 and 12.3”, “Over-Under Guessing Game, 6.6, 6.7 and 14.1”

Friday morning, June 23rd

1. Text file I/O
2. Hands-on: “NSA Encoder, 9.2, 10.6 and 11.6”, “NSA Decoder 9.3, 10.7 and 11.7”, “Term Project: Email Parser, 15.4”
3. Sharing: best ways to assign a comprehensive term project

Reference Materials

At the conclusion of this course, the student should be able to:

1 use primitive data types and data structures offered by the development environment.
2 choose an appropriate data structure for modeling a simple problem.
3 identify basic programming concepts.
4 write simple applications that relate to a specific domain.
5 design, implement, test, and debug a program that uses each of the following fundamental programming constructs: basic computation, simple I/O, standard conditional and iterative structures, and the definition of functions.
6 test applications with sample data.
7 apply core program control structures.

Ref: **C-ID Number: ITIS 130**
Title: Introduction to Programming Concepts and Methodologies
https://c-id.net/descriptor_details.html?descriptor=483

Ref: **Programming Concepts In Python** http://www.rdb3.com/python
http://www.dvc.edu/academics/mcsd/computer-science/pdfs/Compiling.Python.pdf

Ref: Python and PyCharm Installation Steps
Thanks to **Raúl Sanchez,** IT Services Analyst, Coast Community College District
https://www.dropbox.com/s/8y3jktq5t8vcysm/Python%203.5.1%20Install.pdf?dl=0