Concepts Covered in This Course

General Learning Process

- For each concept learned, there will be interactive challenge problems presented to each student.
- At the end of each class, homework projects incorporating all of the lessons for the day will be assigned.
    - This homework is expected to be completed by the start of the next class.

Data Types

Variables

- Understanding variables
- Declaring variables
    - Variable naming conventions
- Assigning values to variables

Integers and Floats

- Declaration of integers and floats
- Understanding the difference between integers and floats
- Arithmetic Operators
    - Addition
    - Subtraction
    - Multiplication
    - Division (including integer division)
    - Exponents
    - Modulo

Strings

- Understanding what strings are
- Declaration of strings
- Concatenating strings
- String functions
    - Displaying strings to the user
    - Finding the length of strings
    - Returning the uppercase values of strings
    - Returning the lowercase values of strings
- Receiving user string input
- Converting strings to integers and vice-versa

Lists, Tuples, and Dictionaries

- Declaration of lists, tuples, and dictionaries
- Understanding the difference between lists, tuples, and dictionaries
- Searching lists and tuples through index
- Slicing lists and tuples
- List and tuple methods
    - Appending to lists and tuples
    - Inserting items into lists and tuples
    - Removing items from lists and tuples
    - Sorting lists and tuples
- Separating Strings into lists (Helpful for reading CSV files when interpreting data)
- Accessing items in a dictionary by key
- Adding items to a dictionary
- Removing items from a dictionary
- Nesting lists, tuples, and dictionaries

If / Elif / Else Statements

- How If / Elif / Else Statements work
- Comparison Operators

    - Greater than
    - Less than
    - Equal to
    - Not equal to
    - Greater or equal than
    - Less than or equal than
- Logical Operators
    - And
    - Or
    - Not
- Booleans
    - Definition
    - Implementation

Loops

- Understanding the differences between while and for loops
    - Iteration of lists, tuples, and dictionaries with for loops
- Declaring while and for loops
- Loop control statements
    - Break
    - Continue
    - Pass

Exceptions

- Understanding exceptions
- Handling exceptions
- Raising exceptions
- Defining clean up actions

Functions

- What is a function?

    - Arguments
- Understanding the scope of variables
    - Global variables
    - Local variables
    - Nonlocal variables
- Defining a function
    - Adding parameters to a function
- Returning an output
    - Implementing this output in the remainder of the program
- Calling/using a function
- Using import
    - Sample packages
    - Creating and using modules
- Understanding and implementing recursion
    - Base case
    - Termination conditions
- __init__

Object Oriented Programming

- Understanding object oriented programming
- Creating classes
    - Constructors
    - Objects
        - Attributes
        - Methods
        - Access modifiers
            - Public
            - Private
            - Protected
- Understanding inheritance
    - Child (derived) vs parent (base) classes
    - How attributes and methods are passed through the classes

    - Method overriding
    - Using super constructors
- Understanding encapsulation and implementing it
- Understanding polymorphism and implementing it
- Understanding multiple inheritance, multilevel inheritance, and method resolution order
- Using operator overloading