

**LESSON 3 – Object Oriented Programming & Custom Iterators**

**Background:** For this lesson, we will be reviewing the principles of object-oriented programming in Python. As well as, the creation of custom iterators.

**SECTION 1 – Basic Classes**

***The following is a basic example of a class.***

* Look at how the object is instantiated and some of the properties/methods you can access from the class
* Observe the output of each print function listed below to understand what they do

class MyClass:

"This is my second class"

a = 10

def func(self):

print('Hello')

ob = MyClass()

# Output: 10

print(MyClass.a)

print(ob.a)

# Output: <function MyClass.func at 0x0000000003079BF8>

print(MyClass.func)

# Output: 'This is my second class'

print(MyClass.\_\_doc\_\_)

**SECTION 2 – Initialization & Constructors**

***The following is a basic example of a class with a constructor***.

* You can see what gets called within the constructor upon instantiation of the class
* Also note the name of the function that is considered the constructor **(\_\_init\_\_)**
* *This is a built-in Python function interpreted at runtime – there are many of these!*

class ComplexNumber:

def \_\_init\_\_(self,r = 0,i = 0):

self.real = r

self.imag = i

def getData(self):

print("{0}+{1}j".format(self.real,self.imag))

# Create a new ComplexNumber object

c1 = ComplexNumber(2,3)

# Call getData() function

# Output: 2+3j

c1.getData()

**Note:** Variables that are defined within the namespace of the class are *only* accessible within the class. See the example on the first page for a method of accessing a class’ public variables.

**SECTION 3 – Custom Iterators**

***Python allows programmers to create their own custom iterators.***

* Study the snippet of code below to understand the built-in functions included

class CustomRange:

def \_\_init\_\_(self, max):

self.max = max

def \_\_iter\_\_(self):

self.curr = 0

return self

def next(self):

numb = self.curr

if self.curr >= self.max:

raise StopIteration

self.curr += 1

return numb

for i in CustomRange(10):

print i

# output:

# 0 1 2 3 4 5 6 7 8 9

***CONTINUE BELOW…***

**SECTION 4 – Exercise Your Python**

1. **Create a new class called toolkit, using all the custom functions you created in the previous lesson**
   1. Add a new function which prints the odd numbers from the given list of numbers in the even numbers function *(1st activity of the last lesson)*

***Note:*** *This means that you should be creating a new function within your class to print all the odd numbers of the given list. Call this new function within your outer “even-number” function.*

1. **Create a custom iterator that prints the Fibonacci sequence up to a given integer *n***
   1. For example, if given ‘n = 6’, output should print ‘1,1,2,3,5,8’ *(6 steps)*