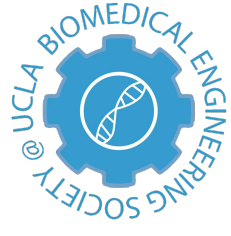
Python and Programming Basics

BMES Cell Team

Winter 2021



Variables and Data Types

- Each variable is **assigned** a name so that we can refer to them later
- There are three main data types you must know for Cell Team

Data Type	Description	Assignment Statement
Integer (int)	Whole Numbers	`name = 6`
Float	Decimals and Fractions	`cellFluorescence = 3.4`
String	Collection of characters	`pieceOf = ”string”`

Print Statements (Numbers)

- To print an integer or float, you can type

```
print(5)
print(5.3)
```

- Or you can type the name of the stored variable directly

```
print(name)
print(cellFluorescence)
```

Print Statements (Strings)

- To print a string, you should type

```
print(“I like string cheese!”)
```

- Likewise, you can type the name of the stored variable directly

```
print(name)
print(cellFluorescence)
```

Print Statements (Concatenation)

- To print a combination of strings and numbers, you need to convert all numbers to strings and add a plus sign:

```
print("Three plus one is " + str(1))
```

- Likewise, you can type the name of the stored variable directly

```
print(pieceOf + str(name))
```

(In this example, let `pieceOf` be a string and `name` be an integer)

Math in Python

- To add two integers or floats, you can assign it to another variable using a plus sign

```
c = a + b
```

- To subtract two integers or floats, you can assign it to another variable using a minus sign

```
d = a – b
```

- To multiply two integers or floats, you can assign it to another variable using an asterisk

```
e = a * b
```

- To divide two integers or floats, you can assign it to another variable using a slash

```
f = a / b
```

Math in Python

- To raise an integer or float to a certain power, you can assign it to another variable using a double asterisk

```
g = a**b
```

Arrays in Python

- You can create an array of strings, floats, or integers by placing them around brackets and separating the values by commas

```
names = [“Jonathan”, “Joe”, Josephine”, “Ray”]

salaries = [34000.32, 42949.34, 98777.68, 20000.43]

age = [20, 32, 49, 19]
```

- You can find the value of a certain entry in an array and assign it to a variable

```
age_Joe = age[1]
```

Note that each array starts with entry 0.

Arrays in Python

```
names = [“Jonathan”, “Joe”, Josephine”, “Ray”]

salaries = [34000.32, 42949.34, 98777.68, 20000.43]

age = [20, 32, 49, 19]

age_Joe = age[1]
```

- You can now print Joe’s age:

```
print(“Joe’s age is “ + str(age_Joe))
```

Statistics

- Python has a library called numpy which computes statistical data
- To use functions associated with this library, you must import it in the **preamble** of your program

```
import numpy as np
```

- To compute the mean and standard deviation of an array of numbers

```
salarySTD = np.std(salaries)
salaryAVG = np.mean(salaries)
```

Note that “salaries” is the name of the array