**I  
INTRODUCTION**

1. **Course Outline**  
   Python Basics  
   Python Basics 2  
   Developer Environments: Terminal, Code Editors, IDEs, Notebooks  
   Advanced Python  
   Careers  
   Scripting in Python  
   Data Scrapping  
   Automation: Selenium  
   Web Development  
   ML & Data Science
2. **Join Our Online Classroom!**  
   [*ZeroToMastery (discord.com)*](https://discord.com/invite/9KxUUxt7Vd)
3. **Exercise: Meet The Community**

**II  
PYTHON INTRODUCTION**

1. **What Is a Programming Language**Set of instructions written in a high-level language which can be translated to machine language by compiler/interpreter.  
   Assembly language: Close to machine language.  
   Python: Close to English.  
   Compiler/Interpreter: Translator between High level language and Machine language.  
   Compiler: Translates entire code all at once and creates a Binary file.  
   Interpreter: Translates codes one line at a time and creates a Byte code which runs on a Cpython Virtual Machine.
2. **Python Interpreter**Python official website: [*https://www.python.org/*](https://www.python.org/) - cPython  
   Jython (Java), PyPy (Python), IronPython (DotNet)
3. **How To Run Python Code**Online repl: [*https://replit.com/*](https://replit.com/)Online repl: [*https://glot.io/*](https://glot.io/)
4. **Note Jumping To Developer Environment**
5. **Our First Python Program**name = input(‘What is your name?\n’)  
   print(‘Hello ’ + name)
6. **Python 2 Vs Python 3**Python (2) was created by “Guido Van Rossum” in 1991. Name was coined from “Monty Python’s Flying Circus”, a comedy series from the 1970s.  
   In 2008, they created Python 3. Some of the features of Python 2 doesn’t work in Python 3 due to some breaking changes.  
     
   Story of Python by Guido Van Rossum: [*https://www.youtube.com/watch?v=J0Aq44Pze-w*](https://www.youtube.com/watch?v=J0Aq44Pze-w)  
   Python 2 Vs Python 3: <https://sebastianraschka.com/Articles/2014_python_2_3_key_diff.html> Python 2 Vs Python 3: [*https://www.geeksforgeeks.org/important-differences-between-python-2-x-and-python-3-x-with-examples/*](https://www.geeksforgeeks.org/important-differences-between-python-2-x-and-python-3-x-with-examples/)
7. **Why So Many Languages**Every Languages have their own strengths and trade-offs.  
   Some languages are fast in executing but slow in writing, like C/C++. On the other hand some are fast in writing and slow in executing, like Python.
8. **Exercise How Does Python Work**  
   Teach someone how fundamentals of Python, how it works.
9. **ZTM Python Cheat Sheet**Python cheat-sheet: [*https://github.com/aneagoie/ztm-python-cheat-sheet*](https://github.com/aneagoie/ztm-python-cheat-sheet)

**III  
PYTHON BASICS**

1. **Learning Python**Terms  
   Data Types  
   Actions  
   Best Practices
2. **Python Data Types**A data type is a classification that specifies which type of value a variable has and what type of mathematical, relational or logical operations can be applied to it without causing an error.  
     
   ***Fundamental Data Types***int  
   float  
   bool  
   str  
   list  
   tuple  
   set  
   dict ***Classes:*** Custom Types ***Modules:*** Specialized Data TypesNone
3. **Latest Version of Python**Python official website: [*https://www.python.org/*](https://www.python.org/)
4. **How to Succeed**Code Alongside the course.
5. **Numbers**Integers & floating point numbers  
   # int & float  
   \*\* -to the power of  
   // -integer division rounded down  
   % -modulo/remainder  
     
   Floating point numbers: [*https://www.youtube.com/watch?v=PZRI1IfStY0*](https://www.youtube.com/watch?v=PZRI1IfStY0)
6. **Math Functions**round : round to nearest integer  
   print(round(3.9)) #4  
   abs : Absolute value  
   print(abs(-20)) #20  
     
   Mathematical functions:[*https://docs.python.org/3/library/math.html*](https://docs.python.org/3/library/math.html)Mathematical functions: [*https://www.programiz.com/python-programming/modules/math*](https://www.programiz.com/python-programming/modules/math)
7. **Developer Fundamentals I  
     
   *Don’t read the dictionary:***   
   Don’t memorize every single thing, just know things are there. Focus on using language.
8. **Operator Precedence**()  
   \*\*  
   \* /  
   + -
9. **Exercise Operator Precedence**Operator Precedence Exercise: [*https://replit.com/@aneagoie/Operator-Precedence*](https://replit.com/@aneagoie/Operator-Precedence)
10. **Optional: bin() and complex**complex: real number + imaginary number  
    Python int function: [*https://www.geeksforgeeks.org/python-int-function/*](https://www.geeksforgeeks.org/python-int-function/)   
    bin(): Binary number  
    print(bin(5)) #0b101  
    print(int(‘0b101’, 2)) #5 -(“number”, base of number)
11. **Variables**A variable is a value that can change depending on conditions or on information passed to the program.snake\_case  
    Starts with lower case or underscore  
    Letters, numbers or underscores  
    Case sensitive  
    Don’t overwrite keywords  
    Variable names should be descriptive  
      
    Variables in python starting with underscore ( \_ ) signifies private variables.  
    Python Keywords: [*https://www.w3schools.com/python/python\_ref\_keywords.asp*](https://www.w3schools.com/python/python_ref_keywords.asp)   
      
    ***Constants:***  
    Keep constants capital.  
    PI = 3.14  
    Values of constants should not be changed once assigned.   
      
    ***Dunder Variables:***  
    Starts with two underscores.  
    We should not create variables starting with two underscores.  
      
    a, b, c = 1, 2, 3
12. **Expressions vs Statements**iq = 100  
    user\_age = iq / 5  
      
    An expression is a piece of code which produces a value, (iq/5) is an expression here. An entire line of code is a statement.
13. **Augmented Assignment Operator**some\_value = 5  
    some\_value += 2 # some\_value = some\_value + 2  
    Augmented Assignment Operator repl: [*https://replit.com/@aneagoie/Augmented-Assignment-Operator*](https://replit.com/@aneagoie/Augmented-Assignment-Operator)
14. **Strings**Strings can be denoted using single quotes or double quotes and triple quotes for multi-line strings.
15. **String Concatenation**it means adding strings together.  
    print(‘hello’ + ‘Nitesh’)  
    print(‘hello’ + 5) #error
16. **Type Conversion**print(str(100))  
    print(type(str(100)))  
    print(type(int(str(100))))  
    print("Hello " + str(21))  
    a = str(100)  
    b = int(a)  
    c = type(b)  
    print(c)
17. **Escape Sequences**weather = “\t It\’s \“kind of\” sunny \n Hope you have a good day!”  
    print(weather)  
      
    ‘\t’: tab  
    ‘\n’: new line
18. **Formatted Strings**name = "Nitesh"

age = 27

print("Hi " + name + "! You are " + str(age) + " years old.\n")

# Python 3 formatted strings

print(f"Hi {name}! You are {age} years old.\n")  
  
String Formatting: <https://replit.com/@aneagoie/string-formatting>

1. **String Indexes**String Slicing**:** [start: stop: step-over]selfish = ‘01234567’  
    #01234567  
     
   print(selfish[::-1]) # Reverses the string  
   String Indexes Exercise: [*https://replit.com/@aneagoie/string-indexes*](https://replit.com/@aneagoie/string-indexes)
2. **Immutability**Strings in python are immutable, means it cannot be changed.  
   Part of a string can’t be assigned, although whole string can be reassigned a new value.
3. **Built in Functions and Methods**Python Built-in Functions: [*https://docs.python.org/3/library/functions.html*](https://docs.python.org/3/library/functions.html)Python String Methods: [*Python String Methods (w3schools.com)*](https://www.w3schools.com/python/python_ref_string.asp)  
   Methods are actions which are owned by the objects, like strings or lists etc.  
   Python string methods doesn’t replace the original string.
4. **Booleans**bool = True/False  
   True = 1  
   False = 0
5. **Exercise: Type Conversion**input() function returns a string.  
   Q.> Input “What year were you born?” and print the age.
6. **Developers Fundamentals: II**Comments: Python uses # to add comment in code.  
   Comments should be added when something complex is written in code to let other programmers understand the piece of code.  
   Comments should be concise and minimal.  
     
   Writing Comments in Python (Guide): [*https://realpython.com/python-comments-guide/*](https://realpython.com/python-comments-guide/)
7. **Exercise: Password Checker**Q.> Input username and password and print “Password is --- length long”.
8. **Lists**List is an ordered sequence of objects.List items are contained within square brackets [].
9. **List Slicing**list[start : stop : stepover]  
   Lists are mutable, that is list items can be changed/updated.  
   List slicing doesn’t change the original list but creates a new list.  
     
   Lists Exercise: [*https://replit.com/@aneagoie/lists*](https://replit.com/@aneagoie/lists)
10. **Matrix**Matrix is a multi-dimensional list/array.  
    Matrix Exercise: [*https://replit.com/@aneagoie/matrix*](https://replit.com/@aneagoie/matrix)
11. **List Methods**Append/Insert/Extend/Remove changes the list in-place. It doesn’t create a new list.  
    Append adds item to the end of the existing list.  
    Insert adds item to the desired index.  
    Extend adds items (iterable) at the end of the list.  
    Pop removes the last element from the list. Pop(index) removes the element at the index in the list.  
    Pop returns the popped element from the list.  
    Remove(value) removes the given value from the list.  
    Clear removes all the elements of the list.  
    Python List Methods: [*https://www.w3schools.com/python/python\_ref\_list.asp*](https://www.w3schools.com/python/python_ref_list.asp)
12. **List Methods 2**Index returns the first occurrence for the element in the list.  
    In keyword returns if some element/string is present in the list/string (True/False).  
    Count returns the number of times the element occurs in the list.  
    Python Keywords: [*https://www.w3schools.com/python/python\_ref\_keywords.asp*](https://www.w3schools.com/python/python_ref_keywords.asp) List Methods Exercise: [*https://replit.com/@aneagoie/lists-2*](https://replit.com/@aneagoie/lists-2)
13. **List Methods 3**Sort method sorts the list in-place.  
    Sorted() function sorts the list out-of-place. It doesn’t change the original list.  
    Copy method copies the list and returns the same.  
    Reverse method reverses the list. It doesn’t sort.
14. **Common List Patterns**print(basket[::-1) #Reverses the list, out-of-place  
    List Methods Exercise 2: [*https://replit.com/@aneagoie/lists-3*](https://replit.com/@aneagoie/lists-3)
15. **List Unpacking**

a, b, c, \*other, d = [1, 2, 3, 4, 5, 6, 7, 8, 9]

a= 1, b= 2, c= 3, other= [4, 5, 6, 7, 8], d= 9

1. **None**None is a datatype in Python. It refers to absence of value. In other programming languages it is denoted by Null.
2. **Dictionaries**A dictionary is an unordered Key-Value pair.  
   dictionary = {key: value}
3. **Developer Fundamentals III**Understanding Data Structures.  
   When to use which data structure.
4. **Dictionary Keys**Dictionary keys must be immutable like strings, integers, booleans etc.  
   Dictionary key needs to be unique otherwise its value gets overwritten.
5. **Dictionary Methods**.get() method returns the value of the argument key. It returns None/default value if key doesn’t exist is the dictionary.  
   Python Dictionary Methods: [*https://www.w3schools.com/python/python\_ref\_dictionary.asp*](https://www.w3schools.com/python/python_ref_dictionary.asp)
6. **Dictionary Methods 2**Dictionary Exercise:[*https://replit.com/@aneagoie/dictionary*](https://replit.com/@aneagoie/dictionary)
7. **Tuples**Tuples are immutable lists.  
   Tuple is faster than list as data in tuples cannot be changed.
8. **Tuples 2**Tuples with single item in it has a comma (,) attached to its only value. Eg., (2,)  
   Tuples have only two methods: count() and index()  
   Python Tuple Methods: [*https://www.w3schools.com/python/python\_ref\_tuple.asp*](https://www.w3schools.com/python/python_ref_tuple.asp)
9. **Sets**

Sets are unordered collection of unique objects.  
In Sets, values are wrapped around curly brackets.

1. **Sets 2**Python Set Methods: [*https://www.w3schools.com/python/python\_ref\_set.asp*](https://www.w3schools.com/python/python_ref_set.asp)   
     
   .difference()  
   .discard()  
   .difference\_update()  
   .intersection()  
   .isdisjoint()  
   .issubset()  
   .issuperset()  
   .union()  
   Sets Exercise: [*https://replit.com/@aneagoie/sets*](https://replit.com/@aneagoie/sets)

**IV  
Python Basics II**

* + - 1. **Breaking The Flow**

**V  
Developer Environment**

1. **MAC – Python Install**  
   Python installation guide for MAC systems: [*https://osxdaily.com/2018/06/13/how-install-update-python-3x-mac/*](https://osxdaily.com/2018/06/13/how-install-update-python-3x-mac/)
2. **Windows – Python Install**Python official website: [*https://www.python.org/*](https://www.python.org/)Python installation guide for Windows systems: [*https://realpython.com/installing-python/*](https://realpython.com/installing-python/)
3. **Windows – Get Terminal**  
   Terminal installation guide for Windows systems: [*https://www.thewindowsclub.com/install-windows-terminal-on-windows-10*](https://www.thewindowsclub.com/install-windows-terminal-on-windows-10)
4. **Linux – Python Install**  
   Python installation guide for Linux systems: [*https://realpython.com/installing-python/*](https://realpython.com/installing-python/)
5. **Python Developer tools**  
   Terminal  
   Code Editors – lightweight  
   IDEs – Full-fledged environment to write and run code  
   Jupyter Notebooks
6. **Sublime Text**Sublime Text official website: [*https://www.sublimetext.com/3*](https://www.sublimetext.com/3)
7. **Quick Note Upcoming Video**[*The Complete Web Developer in 2023: Zero to Mastery | Udemy*](https://www.udemy.com/course/the-complete-web-developer-zero-to-mastery/?referralCode=FFF295AECF3594CE440E)
8. **Optional Terminal Commands**ls #list // lists all files and folders in directory

pwd # present working directory

cd <folder name> #move pwd to argument folder

cd .. #one directory up

cd / #move to root directory

cd ~ #move to user directory  
clear #clears the terminal

open . #opens current directory (LINUX)  
open <file name> #opens argument file (LINUX)

open –a “<application name>” #open specified application

open –a “<application name>” <file name> # opens specified application with specified application  
start . #opens current directory (WINDOWS)

start <file name> #opens argument file (WINDOWS)

mkdir <folder name> #creates new folder of argument name

touch <file name> #creates file of argument name

mv <old file name> <new file name> #rename file name

rm <file name> #delete argument file  
rm –r <folder name> #delete argument folder (LINUX)  
rmdir <folder name> # delete argument folder (WINDOWS)  
  
TAB key: Auto fill  
UP ARROW key: command history

1. **iTerm Setup**
2. **Using the command line terminal**  
   python <python file> #runs file with program in it
3. **Visual Studio Code**  
   Visual Studio Code official website: [*https://code.visualstudio.com/downloads*](https://code.visualstudio.com/download)
4. **PyCharm**Jetbrains official website: [*https://www.jetbrains.com/pycharm/download/#section=windows*](https://www.jetbrains.com/pycharm/download/#section=windows)
5. **Code Formatting – PEP 8**  
   PEP stands for Python Enhancement Proposals.  
   There are lots of PEPs.  
   PEP 8 is style guide for Python code.
6. **Quick Note Jupyter Notebooks**
7. **Jupyter Notebooks**  
   Anaconda Official Website: [*https://problemsolvingwithpython.com/01-Orientation/01.03-Installing-Anaconda-on-Windows/*](https://problemsolvingwithpython.com/01-Orientation/01.03-Installing-Anaconda-on-Windows/)   
   Jupyter Notebook uses browser as GUI. It doesn’t have its own code editor.  
   Jupyter runs program line by line as soon as it is written. It auto saves file.
8. **Section Review**

**XI  
Modules in Python**

* + - 1. **Modules In Python**  
         Each file of Python in a project is called as module.  
         Naming convention of module is same as variables.  
         import <module name> # import syntax  
         We can import as many modules as required in our project.  
         While importing a module in any project, we don’t need to mention file extension (.py) as all the modules has to be python files.  
         Python interpreter creates a cache and stores a compiled versions of modules to make the code run faster from second time onwards main function is called. Cached version of modules updates every time we change the content of the module.  
         We can access all the functionalities defined in a module through our main function.
      2. **Packages in Python**  
         A folder containing a collection of modules is called as package.  
         import <package name>.<module name> # import syntax  
           
         Python packages have an \_\_init\_\_.py file in it.
      3. **Different Ways To Import**  
           
         import <path to module.module\_name>  
         from <path to module.module\_name> import <function\_name>  
         from <path to module> import <module\_name>  
         from <path to module> import \*
      4. **\_\_name\_\_**All the modules of python are named with their file name.  
         Driver module is named \_\_main\_\_ even if we change the name.  
         if \_\_name\_\_ == ‘\_\_main\_\_’:  
         This syntax is used to ensure the code enclosed within it runs only when the module is explicitly called and not when the module is imported in some other driver module.
      5. **Python Built-in Modules**  
           
         Built-in modules of Python (Standard Library): [*https://docs.python.org/3/py-modindex.html*](https://docs.python.org/3/py-modindex.html)   
         help(<module\_name>) # Documentation of the module  
         dir(<module\_name>) # List all the functions available in the module
      6. **Python Built-in Modules 2**sys.argv # Used to enable users to give arguments directly through terminal.
      7. **Exercise Guessing Game**  
         Solution to Exercise: <https://replit.com/@aneagoie/Guessing-Game>
      8. **Python Package Index**Python Package Index (pypi): [*https://pypi.org/*](https://pypi.org/)   
         Anyone can upload packages in pypi.
      9. **Pip Install**pip –V  
         pip install <pip name> # To install pip from Pypi  
         pip list # lists all the pip installed in the environment  
         Installing pip on all systems: [*https://www.makeuseof.com/tag/install-pip-for-python/*](https://www.makeuseof.com/tag/install-pip-for-python/)
      10. **Virtual Environments**Versioning 1.2.3  
          # 3= bug fixes  
          # 2= new release/added features  
          # 1= breaking changes/major versions.  
            
          We can have different versions of same pip and we can use different ones in different project by installing them separately inside virtual environment.
      11. **Useful Modules**collections # Counter, defaultdict, OrderedDict  
          Counter # Returns the count of every element in the list/str  
          defaultdict # Returns a default value if key doesn’t exist in the dictionary.  
          OrderedDict # Retains the order in which key:value pairs are inserted.
      12. **Useful Modules 2**  
          datetime # Allows to manipulate date and time  
          array # static list in python  
          Array uses less memory and is faster compared to lists.  
            
          When to use array: [*https://stackoverflow.com/questions/176011/python-list-vs-array-when-to-use*](https://stackoverflow.com/questions/176011/python-list-vs-array-when-to-use)
      13. **Developer Fundamentals VI**  
            
          Pros and Cons of libraries:   
          Some libraries might be buggy.  
          We need to use libraries which are maintained well.

**XII  
Debugging In Python**

**How to Debug Code**  
  
Linting: detects errors when we are writing the code.  
Using IDEs and Code Editors: allows us to highlight errors in code.  
  
pdb # Python built-in debugger  
help  
list  
step  
continue  
exit  
  
The Python Debugger: [*https://docs.python.org/3/library/pdb.html*](https://docs.python.org/3/library/pdb.html)

**XIII  
File IO**

* + - 1. **Working With Files In Python**IO stands for input-output.  
         open(<file\_name>): to open any file.  
         .read(): to read entire file. It brings the cursor to the end of the file.   
         .seek(<index>): to move the cursor to specified index of the opened file.  
         .readline(): to read one line of the opened file.  
         .readlines(): to get a list of all the lines of opened file.  
         .close(): to close the opened file.
      2. **Read, Write, Append**with open(<file\_name>) as <variable\_name>: file opened like this don’t need to be close.  
         mode=’r’: opening file in reading mode. This is default mode of open statement.  
         mode=’w’: opening file in writing mode. Returns the number of (characters written) indexes moved by cursor while writing. Clears the file before writing. Creates a new file if it doesn’t exist.  
         mode=:r+’: opening file in read + write mode. Writing with this mode, overwrites the existing content of the file without clearing it. It will throw an error if file doesn’t exist at the specified location.  
         mode=’a’: opening file in append mode. Returns the number of (characters written) indexes moved by cursor while writing. Writes the provided content at the end of existing file. Creates a new file if it doesn’t exist.
      3. **File Path**“.\\test\_folder\\test.txt”: to access file with relative file path (WINDOWS).  
         “./test\_folder/test.txt”: to access file with relative file path (LINUX).  
         “D:\…\\test\_folder\\test.txt”: to access file with absolute file path (WINDOWS).  
         “Users/…/test\_folder/test.txt”: to access file with absolute file path (LINUX).  
         Python module pathlib: [*https://docs.python.org/3/library/pathlib.html*](https://docs.python.org/3/library/pathlib.html)
      4. **File IO Errors**  
         FileNotFoundError: When file is not found at the specified path.  
         IOError: When system has difficulty reading or writing the file.
      5. **Exercise Translator:**Build an offline translator using Python modules and files.  
         Python Pypi translator module: [*https://pypi.org/project/translate/*](https://pypi.org/project/translate/)

**XXIII  
Bonus Extra Bits**

1. **Quick Note Upcoming Videos**[***The Complete Web Developer: Zero to Mastery***](https://www.udemy.com/course/the-complete-web-developer-zero-to-mastery/?referralCode=FFF295AECF3594CE440E)
2. **CWD Git + Github**GitHub is used for source control. It can help to counter merge conflict problem when more than one developer is working on same project.  
     
   Git official website: [*https://git-scm.com/downloads*](https://git-scm.com/downloads)# Git Bash:  
   git clone <repository path> #clone repository to local

git status #get status of local files

git add <file name> #add files to commit list

git add . #add all files to commit list

git commit –m“<message>” #commit files to GitHub

git push #finish commit to GitHub

git pull #grab latest commit from GitHub  
git log #to get detailed commit history

git log –oneline #to get brief commit history  
git log graph #to get the graph of branches

**Bibliography**

[*https://zerotomastery.io/community/coding-challenges/*](https://zerotomastery.io/community/coding-challenges/)

[*https://zerotomastery.io/blog/*](https://zerotomastery.io/blog/)

[*https://zerotomastery.io/resources/*](https://zerotomastery.io/resources/)

[*https://zerotomastery.io/blog/?tag=PM&utm\_source=udemy&utm\_medium=coursecontent#monthly*](https://zerotomastery.io/blog/?tag=PM&utm_source=udemy&utm_medium=coursecontent#monthly)

[*https://zerotomastery.io/blog/?utm\_source=udemy&utm\_medium=coursecontent#monthly*](https://zerotomastery.io/blog/?utm_source=udemy&utm_medium=coursecontent#monthly)

[*https://www.linkedin.com/groups/12121940/*](https://www.linkedin.com/groups/12121940/)

[*https://www.linkedin.com/school/64685953/*](https://www.linkedin.com/school/64685953/)