Government of Pakistan

National Vocational and Technical Training Commission

Prime Minister Hunarmand Pakistan Program,

"Skills for All"

Course Contents/ Lesson Plan

Course Title: Advance Python Programming & Applications

Duration: 3 Months

NAVTTC HQs, Plot no. 38, Kirthar Road, H-9 Islamabad
051-9044250

Trainer Name	**Miss Noor Fatima**
Course Title	**Advance Python Programming & Applications**
Objective of Course	**Employable skills and hands on practice for Python Programming & its applications** According to the latest TIOBE Programming Community Index (a software quality company), Python is one of the top 10 popular programming languages of 2017. Python is a general purpose and high-level programming language. You can use Python for developing desktop GUI applications, websites and web applications. Also, Python, as a high-level programming language, allows you to focus on core functionality of the application by taking care of common programming tasks. The simple syntax rules of the programming language further make it easier for you to keep the code base readable and application maintainable. The objective of the course is to train the person in such a way so that he/she may be able to learn and understand the advanced technologies and terminologies of python as well as develop tools/software in this domain.
Course Execution Plan	Total Duration of Course: 3 **Months (12 Weeks)**
	Class Hours: **4 Hours per day**
	Theory: 20% Practical: 80%
	Weekly Hours: **20 Hours Per week**
	Total Contact Hours: **2 8 8 Hours**

Learning Outcome of the Course	By the end of this course, the trainees should gain the following competencies: • Understanding of programming techniques • Design and structure of web-based applications • Design and coding skills • Problems Solving Skills • Latest Machine learning techniques • Latest Data science techniques • Python Expertise
Companies Offering Jobs in the respective trade	1. Upwork 2. Freelancing 3. Fiverr 4. Government Institutes 5. Software Houses 6. Crossover 7. All Private Institutes who are managing software
Job Opportunities	Python has been one of the top languages for the last 2-3 years. All over the world there is a high demand in the Python.Industry needs python developers in various fields such as mobile application developer, web developer, Machine learning, Data Science. Nowadays you will find machine Learning everything. This has created new opportunities for all to earn big and make a career out of this field. With the help of this course, we will be able to give technical training of Information Technology to our youth. There are also opportunities for start-up entrepreneurship due to the high demand in the market in following designated jobs; • Software Engineers • Web Developers • Network Administrator • IT Support Officer • Manager / Assistant Manager IT • Machine Learning • Data scientist • Lecturer • Security Analysts • Freelancer
No of Students	

Learning Place	Labs
Instructional Resources	**Development Platform:** ● https://github.com ● https://colab.research.google.com ● www.codeskulptor.org ● www.repl.it **Learning Material:** ● https://github.com ● https://docs.python.org ● https://w3schools.com ● https://tutorialspoint.com ● https://simpleisbetterthancomplex.com ● https://www.geeksforgeeks.org

Scheduled Week	Module Title	Learning Units	Remarks

Week 1/12	Introduction to Python
	Basic programing
	Basic Syntax
		● Keywords
		● Variables & Literals
		● Starting out with Expressions
		● Basic Types
		● Working with variables
		● Arithmetic Operators
		  ○ Unary
		  ○ Binary
		  ○ +, -, x, /, //, %, **
		● More Examples of simple calculations
		● Operators' precedence
		● Variables type conversion/casting	

Week 2/12	Introduction to Debugging & Strings	Debugging ● Syntax Errors ● Runtime Errors Introduction to Strings: ● Input ● Output ● Concat	

	Advance Strings	Introduction to Functions (Just Introduction) ● Syntax ● Calling methods ● arguments ● return Types Mutation Methods ● Upper ● Isupper ● Lower ● Islower ● Count ● Strip ● Replace ● Join ● Split ● Substring ● Index ● Negative index Sample activity/project/assignment	
Week 3/12	List Data type & Methods	Methods ● Append ● Pop ● Prepend ● Sort ● Count ● Index (+ve and -ve) ● Insert ● Remove List comprehension Mutation Sample activity/project/assignment	

Week 3/12	Dictionary Data type & Methods	Methods ● Keys ● Values ● Items ● Merging ● Pop ● Clear ● Copy Mutation ● Dictionary comprehension Sample activity/project/assignment	
Week 4/12	Tuple & Sets	Tuple ● Definition ● Builtin Methods ● Mutation Sets ● Definition ● Builtin Method	
Week 4/12	Flow Control	Conditions ● Simple ● Multiple ● Nesting ● Logical Operators (>, <, ==, <, is, >=, <=) Loops ● While ● For	
Week 5/12		● For in ● Nesting ● Range ● Break ● Continue Nesting of loops & conditions Exception handling ● Try ● Except ● Finally	

Week 6/12	Functions	Syntax ● Define ● Calling Benefits ● Reuse ● Code separation Arguments ● Default Arguments ● Optional Arguments ● Pass by Value & Reference Variable Scope (Global, local)	
Week 7/12	Projects	**Project examples** ● Paper Scissor Rock Game ● All Temperature calculator ● Unit conversion system ● Number guessing ● Marks grade/average calculations	
Week 8/12	Packages/Modules &Object-Oriented Programming	Packages ● Examples (math, csv, os, sys) ● Modules ● Classes	
Week 9/12	Advance OOP 1	Objects Method ● Class ● Object ● Static Accessors ● Private ('_') ● Public Self Properties Constructor (__init__())	

Week 10/12	Advance OOP 2	Inheritance ● Why ● Benefits ● Single ● Multiple ● Overriding ● Method overriding Polymorphism Composition Operator Overloading Examples + Assignments	
Week 11/12	I/O Operations	File Handling ● Open ● Modes (w, w+, wb, r) ● With Keyword File Types ● TXT ● CSV ○ Reader ○ Dict reader ○ Writer ○ Writerow ○ Writerows ● JSON Nested Data Structures ● Array ○ Array of array ○ Array of dicts ○ Array of tuples	

Week 12/12	Final Project Progress	Final Project Progress	
	Final Project Evaluation	• Job Market Searching • Self-employment • Freelancing sites • Final Assessment	

List of Machinery / Equipment

Sr. No	Name of item as per curriculum	Quantity physically available at the training location
1	Computers Minimum Core-i5 ● LCD Display 17" with built in speakers	25
2	DSL Internet Connection (Minimum 1 MB)	Available on every PC
3	**Accessories/Devices** ● Connectors ● Multimedia ● Printer (NW printer) ● Audio/visual aid ● White Board ● Pin Board ● Flip Chart Board ● Hard copy of Training Material ● Mobile Phones	25 each
4	**Wires, data cables, power plugs, power supply**	For every PC
5	**UPS**	Available
6	**Generator / Solar Backup**	Available
7	**Air Conditioner (2 Tons)**	Available

1. **Software List**

Sr. No	Software Name
1.	MS Office(Installed on each PC)
2.	Operating System (Windows, Linux or other Operating Systems)
3.	Programming Languages including PyCharm, Notebook

4.	Web Servers including IIS, Apache (Licensed software installed on each PC)
5.	Databases including MySQL, ERWIN (Licensed software installed on each PC)
6.	FTP Client including FileZilla, File Manager (Licensed software installed on each PC)
7.	Web hosting manager/control panel
8.	Web browser including Internet Explorer, Google Chrome, Mozilla Firefox, Netscape, Opera (installed on each PC)
9.	Firewall (each PC)
10.	Security scanning tools including Antivirus (each PC) Networking

2. Minimum Qualification of Teachers / Instructor

The qualification of teachers / instructor of this course should be a minimum**of bachelors in Computer science with minimum 3 years of development experience** in relevant trade.

- Bachelor's of Computers Science / Networks / Electrical Engineering (Hons)

3. Supportive Notes

Teaching Learning Material

Books Name	**Author**
Python Crash Course	Eric Matthews
Learn Python the Hard Way	Zed A. Shaw
Python Programming: An Introduction to Computer Science	John Zelle