

Course Content

Unit 1. An Introduction to Python

Introduction, A Brief History of Python, Python Versions, Installing Python, Environment Variables, Executing Python from the Command Line, IDLE, Editing Python Files, Python Documentation, Getting Help, Dynamic Types, Python Reserved Words, Naming Conventions

Basic Python Syntax

Basic Syntax, Comments, String Values, String Methods, The format Method, String Operators, Numeric Data Types, Conversion Functions, Simple Output, Simple Input, The % Method, The print Function

Language Components

Indenting Requirements, if Statement, Relational and Logical Operators, Bit Wise Operators, the while Loop, break and continue, the for Loop.

Unit 2.

Collections

Introduction, Lists, Tuples, Sets, Dictionaries, Sorting Dictionaries, Copying Collections, Summary

Functions

Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Functions - "First Class Citizens", Passing Functions to a Function, map, filter, Mapping Functions in a Dictionary, Lambda, Inner Functions, Closures

Modules

Modules, Standard Modules – sys, math, time, The dir Function

Unit 3.

Exceptions

Errors, Runtime Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions, raise, assert.

Input and Output

Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data from a File, Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories, Metadata, The pickle Module

Unit 4.

Classes in Python

Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes

Regular Expressions

Introduction, Simple Character Matches, Special Characters, Character Classes, Quantifiers, The Dot Character, Greedy Matches, Grouping, Matching at Beginning or End, Match Objects, Substituting, splitting a String, Compiling Regular Expressions, Flags.

Unit 5.

Data Structures

List Comprehensions, Nested List Comprehensions, Dictionary Comprehensions, Dictionaries with Compound Values, Processing Lists in Parallel, Specialized Sorts, Time Functionality, Generators.

Writing GUIs in Python

Introduction, Components and Events, An Example GUI, The Tk Widget, Button Widgets, Entry Widgets, Text Widgets, Checkbutton Widgets, Radiobutton Widgets, Listbox Widgets, Frame Widgets, Menu Widgets, Toplevel Widgets, Dialogs.

Python and CGI Scripts

What is CGI, HTML, HTML Forms, A Guestbook Application, What Can Go Wrong! HTML Tables, The CGI Script, Rendering of the Script.

Unit 6.

The OS Module

The Environment, creating a Process, Listing Files, Other Process Methods, File Information (Metadata), Working with Directories.

Network Programming

Networking Fundamentals, The Client/Server Model, The socket Module, A Client Program, A Server Program, An Evaluation Client and Server, A Threaded Server.

Numerical Analysis & Plotting

Numpy – Overview, Setup, Datatypes, Basic Operators, Indexing, Broadcasting, Matrix Operators.

Matplotlib-Overview, Setup, Basic plots, Customizing plots, Subplots, 3D plots.

Data Processing with Pandas

Pandas – Overview, Setup, Data Structures, Indexing & Selecting Data, groupby Operations, Reshaping data.