Suggested Teaching Guidelines for

Python & R Programming
PG-DBDA September 2022

List of Books / Other training material

Text Book:

1. Learn Python the Hard Way, Zed A.Shaw, Pearson

Reference Book:

1. Introduction to Computer Science using Python, Charles/ Wiley
2. Python Power!: The Comprehensive Guide
3. Python Crash Course: A Hands-on, Project-Based Introduction to Programming
4. Beginning Programming with Python For DummiesLearning Python by: Fabrizio Romano
5. Python Projects by Laura Cassell , Alan Gauld / Wiley
6. Python Cookbook by David B. Brain K. Jones / Shroff / O'reilly Publisher
7. Head First Python by Paul Barry / Shroff / O'reilly Publisher
8. Professional Iron Python by John Paul Muller / Wiley India Pvt Ltd
9. Beginning Programming with Python for Dummies by John Paul Muller / Wiley India Pvt Ltd

Note: Each session mentioned is for theory and of 2 hours duration. Lab assignments are indicatives, faculty need to assign more assignments for better practice.

Session 1:

- Installing Python
- Introduction to Python
- Basic Syntax,
- Data Types, Variables, Operators, Input/output,
- Declaring variable, data types in programs
- Your First Python Program
- Flow of Control (Modules, Branching)
- If, If- else, Nested if-else
- Looping, For, While,
- Nested loops
- Control Structure
- Uses of Break & Continue

Session 2:

- Pass, Strings and Tuples
- Accessing Strings
- Basic Operations
- Assigning Multiple Values at Once
- Formatting Strings
- String slices,

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Session 3:

- Dictionaries
- Introducing Dictionaries
- Defining Dictionaries
- Modifying Dictionaries
- Deleting Items from Dictionaries

Session 4:

- Working with Lists
- Introducing Lists
- Defining Lists
- Declare, assign and retrieve values from Lists
- Accessing list
- Operations in Lists
- Adding Elements to Lists
- Searching Lists
- Deleting List Elements
- Using List Operators
- Mapping Lists
- Joining Lists and Splitting Strings
- Historical Note on String Methods

Session 5:

- Function and Methods
- Defining a function
- Calling a function
- Types of functions
- Function Arguments
- Anonymous functions(Lambda, Map, List comprehension)
- Global and local variables
- Using Optional and Named Arguments
- Using type, str, dir, and Other Built-In Functions
- Concepts of Modules

Session 6:

- Working with Tuples
- Introducing Tuples
- Accessing tuples
- Operation

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- What's an Object?
- Indenting Code
- Native Data types
- Declaring variables
- Referencing Variables
- Object References
- Class and object
- Attributes, Inheritance
- Overloading & Overriding
- Data hiding
- Regular Expressions Using python
- Object Oriented Linux Environment

- gpa=(1/3)*m1+(1/2)*m2+(1/4)*m3

- Create an array to store Multiple students.
  1. Display All Student
  2. Search by id
  3. Search by name
  4. calculate GPA of a student
  5. Exit

Session 7 & 8:

Advanced Python:

- Object Oriented Python
- OOPs concc

- Operations Exception
- Exception Handling
- Except clause
- Try finally clause
- User Defined Exceptions

Session 10 , 11 &12:

- Working with Pandas
- Data wrangling with Pandas
- Working with NumPy
- Data cleaning with Python

Session 13 & 14:

- Working with beautiful soup
- Working with matplotlib, seaborn
- Working with ggplot, plotly

Session 15:

- Load Images using pillow
- Load audio files using scikit-learn(scipy.io)

Session 16:

- Connecting DB's with Python
- Working with DB's using Python
- Accessing and Manipulating DB's
- Creation of Python virtual Environment

R-Programming:

Session 17:

- The R project for Statistical Computing
- Why R
- Introduction & Installation of R
- R Basics, Finding Help,
- Code Editors for R,
- Exploring R Gui
- Exploring RStudio
- Basic Mathematical & Arithmetic operations in R

Session 18:

- Data Objects- Data Types & Data Structures (e.g. lists. Arrays, matrices, data frames)
- Packages in R

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- Working with Packages
- Handling Data in R Workspace
- Reading & Importing data from Text files, Excel files, Multiple databases
- Exporting Data from R

Session 19:

- Introduction to tidy verse (group of packages)
- Manipulating and Processing Data in R
- Creating, Accessing and Sorting data frames
- Extracting, Combining, Merging, reshaping data frames

Session 20:

- Functions
- Built in functions in R (numeric, character, statistical)
- Interactive reporting with R markdown
- Case study