

Data Analysis and Programming with Python Lab (Skill oriented Course-1)

Course Code: 22CH11S1

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Prerequisites: Problem solving using C, Mathematics

Course Outcomes: At the end of the Course the student shall be able to

CO1: Illustrate Decision Making statements and control loops. (L3)

CO2: Develop programs with functions and strings to perform simple tasks. (L3)

CO3: Develop programs with different data types like lists, tuples, sets, dictionaries. (L3)

CO4: Demonstrate manipulation of the data using NumPy, read/write the data from excel/Notepad.(L3)

CO5: Demonstrate data cleaning and Visualization of the Data. (L3)

1. Basics of Python Programming

- A. Write a program to display the statements.
- B. Write a program to demonstrate the basic data types in python.
- C. Write a program to format string and numbers.
- D. Write a program to compute arithmetic operations taking input from the user and display the result.

2. Decision and Control Statements:

- A. Write a program to check whether the given number is even or odd.
- B. Write a program to find the largest element among the given numbers (multi-way if-elif-else statements.).
- C. Write a program to print the sum of all the even numbers in between two numbers.
- D. Write a program to display all prime numbers up to n.

3. Functions

- A. Write a program to find the sum of first n integers using function.
- B. Write a function which returns the value of the quadratic equation, discriminant, sum and product of the roots.
- C. Write a program to define a function using default arguments.

4. Strings:

- A. Write a program to create a string and use any 6 inbuilt python functions for strings.
- B. Write a program to access characters in a given string through index operator.
- C. Write a program to traverse all the elements of string using for loop and check if two strings are anagrams or not.

5. Lists

- A. Write a program to create a list and perform the following operations:
 - i. +
 - ii. *
 - iii. Slicing
 - iv. del
- B. Write a program to perform any 6 built-in functions by taking any list.

6. Tuples

- A. Write a program to create tuples (name, age, address, college) for at least two members and display the concatenation of tuples and print the first tuple n number of times.

7. Sets

- A. Write a program to create two sets and perform the following operations:
 - i. Union
 - ii. Intersection
 - iii. Difference
 - iv. Asymmetric Difference
- B. Write a program to check whether the given set is a subset or superset of another set.

8. Dictionaries

- A. Write a program to generate a dictionary that contains numbers (between 1 and n) in the form of (x, x*x).
- B. Write a program to check if a given key exists in a dictionary or not.
- C. Write a program to add a new key-value pair to an existing dictionary.
- D. Write a program to sum all the items in a given dictionary.

9. Data Manipulation with NumPy

- A. Write a program to create, display, append, insert and reverse the order of the items in the array
- B. Write a program to add, transpose and multiply two matrices.
- C. Write a program to find minimum, maximum, mean, median, standard deviation for a given data.

10. Working with series and DataFrame

- A. Write a program to read and write a data from excel/Notepad
- B. Write a program to merge, filter, sort data in a given DataFrame

11. Data Cleaning & Data Preprocessing

- A. Write a program to locate duplicates and missing values in a DataFrame
- B. Write a program for imputing missing values for numerical factors and categorical factors in a DataFrame
- C. Write a program for standardizing column of DataFrame

12. Introduction to Data Visualization with Matplotlib

- A. Write a program to demonstrate the Data Visualization using Line Plot, Scatter Plot, Bar Graph, Box Plot, Pair plots

References:

1. Daniel Liang Y, Introduction to programming using Python, Pearson Publications, 2017.
2. Ashok Namdev Kamathane and Amit Ashok Kamathane, Programming and Problem Solving with Python, 1st edition, McGraw Hill Education (India) Private Limited, 2017.
3. Wes McKinney, Python for Data Analysis, 2nd edition, O'Reilly Media, Publications, 2018