COURSE TITLE	**PYTHON FOR DATA SCIENCE**
COURSE CODE	**05DS0301**
COURSE CREDITS	**6**

Course Outcomes: After completion of this course, student will be able to:

1 Describe basics of Python Programming.
2 Design a Python Program using Functions & Modules.
3 Develop understanding of Exceptions and File Handling in Python.
4 Build their ability to develop Python Programs using Object-Oriented concepts.
5 Understand the basics of python in Data Science.

Pre-requisite of course: Knowledge of any programming language.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	4	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Basics of Python:** • Features of Python andInstalling Python, •Python Built-in Data Types , • Indentation and Block Structuring, Comments, Variables and Assignments, • The None value & Getting input from user, Built-in Operators, • Control Flow and Looping Structures, • Break, Continue and Pass, List, Tuple, Dictionary, Set	12
2	**Functions & Modules:** Function Basics, • Defining and using function with returning values, Working with Strings in python, • Different types of arguments (Required arguments, Variable length Arguments, Default arguments and Keyword Arguments), • Local, nonlocal and global variables and global keyword, • Lambda expressions / Lambda Functions, • Using map(), filter() and reduce() with lambda, •Basics of modules and Import statement (different ways of importing module), • Special Variables in python	8
3	**Exception & Files** • Introduction to Files and Type of Files, • Opening file and file objects, Closing files, • Reading & writing files • Working with Text Files • Working with Binary Files, Using Seek() and tell(), Pickle in python, Introduction to exceptions and Types of Exceptions, Raising Exceptions, Catching and Handling Exceptions, Custom Exceptions, • Using Assert in Exception handling, • Using with statement in Exception	10

Contents : Unit	Topics	Contact Hours
4	**Classes and Object-oriented Programming** • Basics of Object-Oriented Programming with features, Defining class and Use of “self”, • Instance variables, methods, Class variables, methods, • Static methods , • Inner class, • Inheritance & Different types of Inheritance, • super() and method overriding, method overloading, Operator Overloading, Abstract class	10
5	**Python Module for Data Science** • Installing modules • Pandas’ introduction and series, Introduction to DataFrames, Indexing in DataFrames, • Masking and Boolean Indexing • Merging DataFrames, • Creating DataFrames in various ways, • Basic Operations on DataFrames data • Working with Missing data, Basics of Matplotlib, • Introduction to Numpy • Numpy Arrays, Special Arrays in Numpy, Basic • operations in Numpy Arrays, • Slicing and addressing arrays • Array attributes, array creation routines, Array from existing data, Array from ranges	10
Total Hours		**50**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Basics of Python** Write a simple Python Program to INPUT two variables and print Addition, Subtraction, Multiplication and Division of both numbers. Write a program to input 2 number and an arithmetic operator. Display the result accordingly., Write a program to input Principal Amount, Rate and Year and display Simple Interest. Write a program to input radius of a circle, and print area of that circle., Write a program to input a number and print whether it is Even or Odd Number. Write a program to input age of person and display message as follows - If age < 12 print You are Kid - If age between 12 to 17 print You are teenager - If age between 18 to 60 print you are Adult If age > 60 print You are Senior Citizen, Write a Python Program to input marks of 4 subjects and display Total, Percentage, Result and Grade. If student is fail (<40) in any subject then Result should be displayed as “FAIL” and Grade should be displayed as “With Held**” Write a program to demonstrate the use of list and tuple., Write a program to print all numbers which are divisible by 8 between 1 to 200. Write a program to demonstrate the use of range function.	8

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
2	**Funcitons, Modules and Lambda** Write a program to input a number and display Factorial of that number using User defined function. For example, Factorial of 5 = 5 * 4 * 3 * 2 * 1 = 120. Write a program to input a number and display whether number is prime or not using user defined function., Write a program to print the first and last character of a String. Write a program to reverse the given string without using built-in function or looping Write a program to demonstrate the use of Default and Keyword arguments., Write a Python Program to create a function which accepts 3 arguments. (2 numbers and one arithmetic operator). Display answer accordingly Write a program to demonstrate the use of modules. Write a program to create lambda function to add two numbers and display total., Write a program to demonstrate the use of required and variable length arguments. Write a program to demonstrate the use of local, global and non local keywords.	8
3	**Exceptions and Files** Write a program to read names from keyboard and store it into text file Write a program that uses all parts of exception handling in python (try, except, else, finally) Write a program to read any text file line by line, Write a program to read text file having number and display all numbers with total and average at the last. (Manually prepare a file having some numbers and then read it) Write a program to work with custom exception in python Write a program to demonstrate the use of assert statement in python., Write a program to demonstrate the use of with statement in python. Write a program to copy content of one file in another file., Write a python program to demonstrate the use of seek() and tell() Write a python program to append the content in a file.	8
4	**OOP Concepts** Write a Python Program that creates a Student class with various methods. Use setattr() and getattr() on class object Define a class which has at least two methods: getString: to get a string from console input printString: to print the string in upper case. Write a program to create a Bank class where deposits and withdrawals can be handled by using instance methods., Write a program to create Emp Class and make all the members of the Emp class available to another class. e.g. Myclass Write a program to create Student class by deriving it from Teacher class., Write a program to demonstrate the use of Operator Overloading. Write a program to demonstrate the use of Multiple inheritance. Write a Python Program that creates a class and inherit into another class (Base Class : Student with rollno, name, gender, age) (Derived Class : Course with coursename, duration, fee) Use appropriate functions for each class, Write a python program to demonstrate the use of abstract class. Write a python program to demonstrate the use of super() method.	8

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
5	**Concepts of Data Science** Write a python program to display Employee id on x-axis and their salaries on y-axis using bar graph. Write a python program to display Employee id on x-axis and their salaries on y-axis using bar graph for two departments of a company., Write a python program to display a histogram showing the number of employees in specific age group. Write a python program to display a pie chart showing the percentage of employees in each department of a company, Write a python program to create a line graph to display the profit of a company in various years. Write a python program to create a line graph to display the profit of two companies in various years. Write a python program to create a series in pandas., Write a python program to create a dataframe using CSV file in pandas Write a python program to create a numpy array. Write a python program to work with array creation routines.	8
Total Hours		**40**

Textbook :

1 Core Python Programming, Dr. R. Nageswara Rao, Dreamtech Press, 2ndE

2 Core Python Programming , Wesley J. Chun, Prentice Hall, 2ndE

References:

1 Python Programming for Absolute Beginners, Python Programming for Absolute Beginners, Michael Dawson, Premier Press, 1stE

2 Head First Python, Head First Python, Paul Berry, O'REILLY, 1stE

3 The Quick Python Book, The Quick Python Book, Vernon L. Ceder, Manning, 1stE

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking**
20.00	30.00	25.00	15.00	10.00	

Instructional Method:

1 PPT

2 DEMO

3 VIDEO

Supplementary Resources:

1 https://docs.python.org/3/tutorial/

2 https://www.tutorialspoint.com/python/index.htm