Course Code	Course Title				Category
21BTIT411	Python Programming Laboratory				DCC
Contact Hours per Week			CA	FE	Credits
L	T	D/P			
0	0	4	40	60	2

Prerequisite: C/C++/Java basic Programming concepts

Course Objectives:

1. To understand and use various basic data structures in Python
2. To understand various library packages and its usage for various operations on strings, numbers and on other data structures.
3. To understand the use of user defined functions to define own methods
4. To understand various concepts like classes/objects, its operations.
5. To analyze data for optimizing solutions from databases.

COURSE OUTCOMES:

On completion of this course, students will be able to:

21BTIT/DA411.1	Formulate a concrete problem definition for a given problem with consideration of specific data structures and capabilities of a chosen language.
21BTIT/DA411.2	Identify the use of library functions available with the wide variety of library functions to perform operations on datas.
21BTIT/DA411.3	Develop functional, reliable and user friendly programs for given problem statements and constraints.
21BTIT/DA411.4	Design and bundle data and functionality together using user-defined blueprint or prototype from which objects are created
21BTIT/DA411.5	Utilize state-of-the-art tools and techniques for efficient software development.

UNIT I: Python Data Types-Numeric, String	**06 hrs**

1.1 An introduction to Python, installation,

1.2 Basic usage of Python, Applications and input-outputs,

1.3 Data structures-Numbers, sequence types-string,

UNIT II: List, Tuple and Dictionaries	**06 hrs**

2.1 Data Structures-lists, tuples,

2.2 Array, Indexing, Slicing, 2.3 Dictionaries, Equality and identity/Sameness,	
UNIT III: Decision and Loop structures	**06 hrs**
3.1 Conditional and Control flow-conditional, if-the-else-for loop, 3.2 while loop, Python Statements, Assignment statements, 3.3 Print operation, iterations and comprehensions	
UNIT IV: Modules and Defining Class	**06 hrs**
4.1 Modules and function, passing arguments to functions, importing modules, 4.2 Modules, creating modules, Functional Tool, common tasks, 4.3 Class, object, modules and intistilizer.	
UNIT V: Use of Python for Operations on Data/Data Visualization	**06 hrs**
5.1 Symbolic computation (Sympy), 5.2 Numeric computation (numpy):Array 5.3 Visualizing data using matplotlib, pylab.	

TEXT BOOKS:

1. Deitel and Deitel, “C++ How to Program”, Sixth Edition, Prentice Hall, 2007.
2. Lippman S. B., Josee Lajoie, Barbara E. Moo, “C++ Primer ”, Fourth Edition, Pearson Education, 2005.
3. Mark Lutz, “Learning Python”, 5th edition, Orelly Publication, 2013, ISBN 978- 1449355739
4. John Zelle, “Python Programming: An Introduction to Computer Science”, Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 9781590282410
5. Zed A. Shaw, -Learn PYTHON the Hard Way‖, Pearson, ISBN: 978-93-325-8210-1

REFERENCE BOOKS:

1. Michel Dawson, "Python Programming for Absolute Beginner's" , Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1435455009
2. David Beazley, Brian Jones., "Python Cookbook", Third Edition, O'reilly Publication, 2013, ISBN 978-1449340377.

CO-PO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
AS305.1	2	2	1									1	1	1
AS305.2	2	2	1	1								2	1	1
AS305.3	2	2	2	1								2		
AS305.4	2	2	2	1	1							2		
AS305.5	2	2	2	1	1							2	2	2

LIST OF PRACTICAL ASSIGNMENTS:

1. Write a program to check if a number is divisible by both 10 as well as 50. If it is divisible by 30 as well, print "This number is divisible by 10, 50 and 30". If not, print "This number divisible by 10 and 50 but not 30". Use a separate module for comparison and display the result.
2. Write a program to use input() built-in function to take a string input from the user what he/she just typed in. Add another piece of similar code, but have the input be numeric. Also write a module to detect whether a number is positive, negative, or zero. Try using a fixed value at first, then update your program to accept numeric input from the user.
3. Write a program to have the user input three (3) numbers: from, to and increment.Count from f to t in increments of I, inclusive of f and t.

   For example, if the input is

   f==2, t==26, and i==4, the program would show output 2,6,10,14,18,22.

4. Write a python code that prompts user to input a number (n). Then your code will list all the numbers (1-n) with a comma after each number except for the last number. There should be 10 numbers per line.

   a. Using for loop Structure

   b. Using while loop structure

5. Write a program to perform the following operation on strings as str1- "Python programming is

easy" and str2- "Python programming is powerful and joyful".

a. Concatenations of String

b. Multiplication of String

c. Find the length of String

d. Converting String to Upper, Lower, Title, Capitalization

e. Replacing String

f. Find Start and End of String

6. Write a program to perform the following on List

a. Enter a List of Numbers and sort the value in Largest-to-smallest order.

b. Do the same thing, but for strings and in reverse alphabetical order.

c. Create a list with elements as "apple", "banana", cherry", "kiwi", "melon", "mango". Display each with its position

d. Insert "Orange", then Copy list into another list

e. Remove "cherry" from first list and display both the strings

f. Display the third, fourth, and fifth item of first list.

g. Check if "apple" is present in the list display message as present.

h. And then print all items in the list, one by one

i. To delete element at third index and perform pop().

7. Write a program to perform the following on Tuple

a. Write a program to create a tuple of 4 elements.

b. Convert this tuple into a list.

c. Now delete the first element in this list and convert it back to tuple.

8. Assume you are a teacher of a class, Write a Python program using functions to

a. Read the names and total marks scored by students of your class of at least 3 or more students

b. Rank the top 3 students of your class

c. Provide cash reward of Rs. 5000/- who secured first rank, Rs. 3000/- to the student who secured second rank and Rs. 1000/- to the student who secured the third rank. The value of Cash reward cannot be modified.

9. Write a program to accept Person's information as Name , Address, Phone number, Email, and Date of birth. Make use of initialiser to set up a new object. Accept the records for at least 5 persons.
10. Write a program that keeps a record of code and price of each product. Display a menu of all products to use and prompt him to enter the quantity of each item required. Generate a bill and display the total amount.
11. Consider there are some Staff members, students (undergraduate or postgraduate), administrative members associated with University. Write a python program which represents relationships between students, Staff Members and administrative persons associated with a university.
12. Write a program to accept a file name as an input from the user. Open the file and count the number of times a character appears in the file.

Case Studies

1. Loads the dataset and plot the various graphs to detect data patterns and visualize the data.
2. Load the dataset to analyze the behavior of data and draw the insights from data.

Contents beyond Syllabus

1. Use of Python in Game Development using different libraries and packages.
2. Use of Turtle module for simple games and programs development
3. Introduction to Prolog programming in brief.

Assignments based on Problem Solving: - 8

Assignments based on Brainstorming:- 4

Assignments based on Case Studies:- 2

INTERNET RESOURCES:

https://www.python.org

https://www.w3schools.com

https://www.javatpoint.com/python-programs

https://www.analyticsvidhya.com/blog/2021/05/introduction-to-python-programming-beginners-guide/

https://www.sanfoundry.com/python-problems-solutions/

https://www.javatpoint.com/python-tutorial

https://www.coursera.org

MOOC COURSES:

Python 3 Programming | Coursera

Programming for Everybody (Getting Started with Python) | Coursera

Data Analysis with Python | Coursera

Free Python Tutorial - Python for Beginners (2022) | Udemy

LIST OF THEORY ASSIGNMENTS: Ref Lab Manual

1. Fundamentals 30%
2. Design 20%
3. Application 30%
4. Research 20%

LIST OF PRACTICAL ASSIGNMENTS:

1. Fundamentals 30%
2. Design 20%
3. Application 30%
4. Research 20%

LIST OF MULTIDISCIPLINARY ASSIGNMENTS:

1. Python for Data Analytics
2. Python for Data Visualization
3. Python for Deep Learning
4. Python for Machine Learning and Artificial Intelligence
5. Python for Natural Language Processing

ASSESSMENT SCHEME

Continuous assessment of laboratory work is done based on overall performance and lab assignments performance of students.

Guidelines for Student's Lab Journal

- Group Presentation/Coding Competition
- Open ended experiments in Labs
- Project Based Modules
- MOOCs
- Self-Learning

Relevance to	Employability (%)	Skill Development (%)	Entrepreneurship (%)
% Percentage	73.33	53.33	0

Relevance to Or Need of	Local Development	National Development	Regional Development	Global Development
(Low/Medium/High)	High	High	High	High

FUTURE COURSES:

Python for Data Science

Python and R programming for Machine Learning.

Deep Learning and Natural Language Programming

PROFICIENCY IN (SKILLS):

- Python basics and Data Types
- Python Libraries and packages
- Various tools and techniques for efficient software development.