INSTITUTE	FACULTY OF TECHNOLOGY
PROGRAM	BACHELOR OF TECHNOLOGY (COMPUTER ENGINEERING)
SEMESTER	3
COURSE TITLE	PROGRAMMING WITH PYTHON
COURSE CODE	01CE2305
COURSE CREDITS	1

Objective:

1 To introduce core programming basics and program design with functions using Python programming language.

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

1 Demonstrate the use of Python syntax, basic data types, operators, and control structures to construct simple programs.

2 Develop Python code using user-defined functions, recursive functions and manipulate lists using built-in methods and comprehensions.

3 Illustrate the use of tuples, sets, and dictionaries for structured data storage and implement related operations using appropriate Python constructs.

4 Apply data analytics techniques using NumPy and Pandas libraries to manipulate and analyze data, and visualize insights using Matplotlib.

5 Explore the basics of machine learning by utilizing the Scikit-learn library to implement simple models for classification, regression, and clustering tasks

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
0	0	2	0	0	0	25	25

Contents : Unit	Topics	Contact Hours
1	**Introduction** Python Basics: Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program., Operators and Control Statements: Operators: Arithmetic Operators, Operator precedence and Associativity, Bitwise operator, The compound assignment operator, Boolean operators, Boolean Expressions and Relational operators. Decision making statements: Loop Control Statements-while loop, range() function, for loop; break statement, continue statement.	4
2	**Functions and Lists** Functions: Functions- Syntax and basics of a function, Use of a function, Parameters and arguments in a function, The local and global scope of a variable, The return statement, Recursive functions, The lambda function;, Lists: Creating Lists, Accessing the elements of a List, List slicing, Python in-built functions for lists, List Comprehension, List Methods, passing list to a function, Returning a list to function.	4
3	**Tuples, Sets and Dictionaries** Creating tuples: tuple() function, Inbuilt functions for tuples, Indexing and Slicing, Operations on tuples, Passing variable length arguments to tuples, Sort tuples, Traverse tuples from a list, The zip ()function, The Inverse zip(*) function. Sets: Creating sets, The set in and not in operator, The Python Set Class, Set operations;, Dictionaries: Basics of Dictionaries, Creating a Dictionary, Adding and replacing values, Retrieving values, Formatting dictionaries, Deleting items, Comparing two dictionaries, Methods of dictionary class, Traversing dictionaries, Nested dictionaries, Traversing nested dictionaries.	6
4	**Data Analytics and Visualization** NumPy Library: Introduction and Installation of NumPy, NumPy Arrays, Array creation using built-in functions, Attributes and Methods, Array manipulation, Indexing and Iterating, Pandas Library: Introduction to Pandas, Pandas Series, Data Frame, Importing and Exporting data with Excel files, Manipulating a Data Frame, Visualization: Introduction to Matplotlib, Types of Charts, Legends, annotations and style, Plotting directly from Pandas Data Frame and NumPy Arrays	7
5	**Introduction to Machine Learning** Scikit-learn: Machine learning library for classification, regression, clustering	7
Total Hours		**28**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Practical 1** Implementation of variables, different data types and string operations	2
2	**Practical 2** Implementation of types of operators, conditional statements and loop controls	2
3	**Practical 3** Implement the factorial, string palindrome using functions using with and without parameters.	2
4	**Practical 4** Create a list and perform the following methods insert(), remove(), append(), len(), pop(), clear(), sort(), reverse, count, copy	2
5	**Practical 5** Create a tuple and perform the following methods count(), index(), len(), sorted(), min(), max(), tuple(), zip() and inverse zip.	2
6	**Practical 6** Create a set to add element, update, remove methods, all set operations and set comparisons.	2
7	**Practical 7** Create a dictionary and apply the following methods: access keys, values and items; use get(), remove item methods, update values, use len(), copy, membership test, clear	2
8	**Practical 8** Implement NumPy operations to, create array, array operations, array manipulation, indexing, slicing and iterations.	2
9	**Practical 9** Implement Pandas library to create data frame, read a csv file, explore data head(), tail(), info(), describe(), Data manipulation operations, export the data to excel file.	2
10	**Practical 10** Implement matplotlib and seaborn library to create different plots line, scatter, bar, histogram, box, pie chart, heatmaps, annotation and save plot as images.	2
11	**Practical 11** Using Iris CSV dataset build the classification model.	2
12	**Practical 12** Using Housing CSV dataset, implement linear regression to predict house prices.	2
13	**Practical 13** Using Credit Card Customer CSV dataset, implement K-means clustering algorithm.	2
Total Hours		**26**

Textbook :

  1 Python Crash Course, Eric Matthes , No Starch Press, 2019

References:

  1 A Byte of Python, A Byte of Python, Swaroop C H, ebshelf Inc., 2013

  2 Introduction to Python Programming, Introduction to Python Programming, Gowrishankar S., CRC Press, 2019

  3 Python Cookbook: Recipes for Mastering Python, Python Cookbook: Recipes for Mastering Python, David Beazley and Brian K. Jones, O'Reilly Media, 2013

  4 Python for Data Analysis, Python for Data Analysis, Wes McKinney, O'Reilly, 2017

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 / Creative**
0.00	0.00	0.00	0.00	0.00	0.00

Instructional Method:

  1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

  2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

  3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

  4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

  1 https://www.kaggle.com/

  2 https://scikit-learn.org/

  3 https://www.learnpython.org/

  4 https://www.programiz.com/